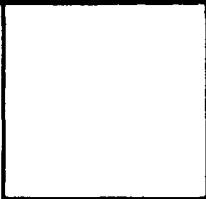


LOAN DOCUMENT

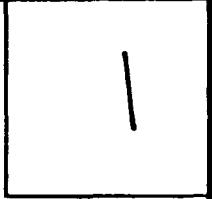
AD-A238 999



DTIC ACCESSION NUMBER



PHOTOGRAPH THIS SHEET

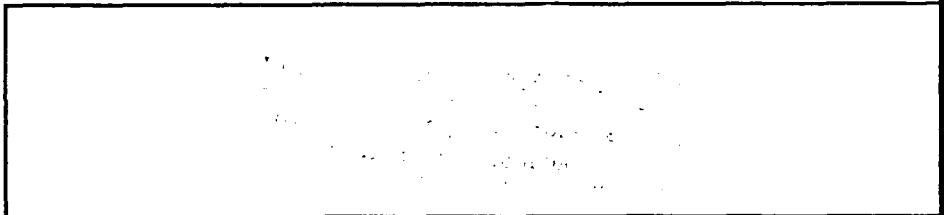


INVENTORY

WL-TR-91-8026
DOCUMENT IDENTIFICATION
Jul 1991

DOCUMENT IDENTIFICATION

Jul 1991



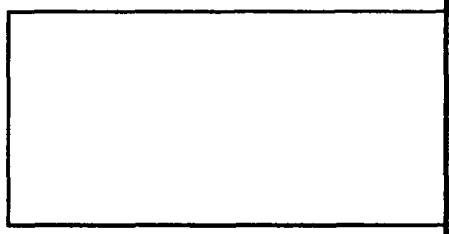
DISTRIBUTION STATEMENT

ACCESSION FOR	
NTIS	GRADE
DTIC	TRAC
UNANNOUNCED	
JUSTIFICATION	
BY	
DISTRIBUTION/	
AVAILABILITY CODES	
DISTRIBUTION	AVAILABILITY AND/OR SPECIAL
A-1	

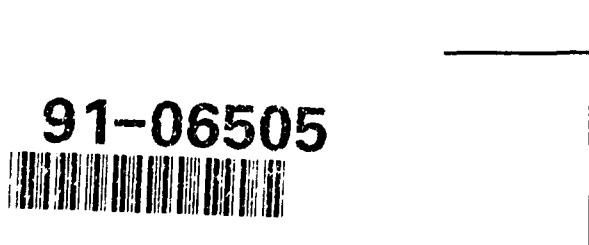


DISTRIBUTION STAMP

DATE ACCESSIONED



DATE RETURNED



DATE RECEIVED IN DTIC

REGISTERED OR CERTIFIED NUMBER

PHOTOGRAPH THIS SHEET AND RETURN TO DTIC-FDAC

WL-TR-91-8026

AD-A238 999



PRODUCT DEFINITION DATA INTERFACE (PDDI)

Schema Manager User's Manual

McDonnell Aircraft Company
McDonnell Douglas Corporation
P. O. Box 516
St. Louis, MO 63166

July 1991

Final Report

Approved for public release; distribution is unlimited.

MANUFACTURING TECHNOLOGY DIRECTORATE
WRIGHT LABORATORY
AIR FORCE SYSTEMS COMMAND
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433-6533

NOTICE

When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely Government-related procurement, the United States Government incurs no responsibility or any obligation whatsoever. The fact that the government may have formulated or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication, or otherwise in any manner construed, as licensing the holder, or any other person or corporation; or as conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

This report is releasable to the National Technical Information Service (NTIS). At NTIS, it will be available to the general public, including foreign nations.

This technical report has been reviewed and is approved for publication.

Alan R. Winn
ALAN R. WINN
Project Manager

30 May '91

DATE

FOR THE COMMANDER:

Bruce Rasmussen
BRUCE A. RASMUSSEN, Chief
Integration Technology Division
Manufacturing Technology Directorate

31 May 91

DATE

If your address has changed, if you wish to be removed from our mailing list, or if the addressee is no longer employed by your organization please notify WL/MTIB, WPAFB, OH 45433-6533 to help us maintain a current mailing list.

Copies of this report should not be returned unless return is required by security considerations, contractual obligations, or notice on a specific document.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1. REPORT SECURITY CLASSIFICATION Unclassified		1b. RESTRICTIVE MARKINGS	
2a. SECURITY CLASSIFICATION AUTHORITY UNCLASSIFIED		3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution is unlimited.	
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE			
4. PERFORMING ORGANIZATION REPORT NUMBER(S)		5. MONITORING ORGANIZATION REPORT NUMBER(S) WL-TR-91-8026	
6a. NAME OF PERFORMING ORGANIZATION McDonnell Aircraft Company	6b. OFFICE SYMBOL (If applicable) MCAIR	7a. NAME OF MONITORING ORGANIZATION Manufacturing Technology Dir. (WL/MTIB) Wright Laboratory	
6c. ADDRESS (City, State, and ZIP Code) McDonnell Douglas Corporation P. O. Box 516, St. Louis, MO 63166		7b. ADDRESS (City, State, and ZIP Code) Wright-Patterson AFB, OH 45433-6533	
8a. NAME OF FUNDING/SPONSORING ORGANIZATION	8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER F33615-82-C-5036	
8c. ADDRESS (City, State, and ZIP Code) Wright-Patterson Air Force Base, Ohio 45433-6533		10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. 78011F PROJECT NO. 3095 TASK NO. 06 WORK UNIT ACCESSION NO. 29	

11. TITLE (Include Security Classification)

PRODUCT DEFINITION DATA INTERFACE (PDDI), Schema Manager User's Manual

12. PERSONAL AUTHOR(S)
(see reverse side)

13a. TYPE OF REPORT Final	13b. TIME COVERED FROM _____ TO Dec 87	14. DATE OF REPORT (Year, Month, Day) July 1991	15. PAGE COUNT 159
------------------------------	---	--	-----------------------

16. SUPPLEMENTARY NOTATION

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)	
FIELD 1308	GROUP 0905	SUB-GROUP	Product Definition Data Life Cycle Document Engrg./Mfg. Interface	ICAM Architecture CAD/CAM (continued on back)

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

This document is the Schema Manager User Manual for the Product Definition Data Interface (PDDI) Extensions Project. This document provides procedures to use the Schema Manager Software.

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT <input type="checkbox"/> DTIC USERS			21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED
22a. NAME OF RESPONSIBLE INDIVIDUAL Alan Winn			22b. TELEPHONE (Include Area Code) (513) 255-8787
			22c. OFFICE SYMBOL WL/MTIB

12. Personal Author(s):

Behan, Linda
Burch, Jama
Choi, Mun
Magnuson, Charles
Mohme, Carl
Scheller, Robert
White, George

18. Subject Terms:

Needs Analysis Document
System Requirement Document
State-of-the-Art Document
System Specification Document
SS - Draft Standard
System Design Specification
Operators Manual
Users Manual - Access Software
Users Manual - Translator

UM560130002
22 December 1987

FOREWORD

This document was produced under Air Force Contract F33615-82-C-5036, Product Definition Data Interface (PDDI). This contract is sponsored by the Air Force Wright Aeronautical Laboratories, Materials Laboratory, Air Force Systems Command, Wright-Patterson Air Force Base, Ohio 45433-6533.

This User Manual provides for use of the Schema Manager Software. This Software was developed for the Geometric Modeling Applications Interface Program (GMAP), and enhanced for this PDDI project. Additional information will be added to this manual under the GMAP effort. The GMAP Schema Manager User Manual will supercede this document.

This program is being administered under the technical direction of Lt. Eric Gunther, ICAM Project Manager. The MCAIR Program Manager is Mr. Jerry Weiss and Mr. Herb Ryan is the Deputy Program Manager.

This document was prepared in accordance with the ICAM Configuration Management Life Cycle Documentation requirements for the Configuration Item.

TABLE OF CONTENTS

	<u>Page</u>
FOREWORD	i
1.0 INTRODUCTION	1-1
1.1 Identification	1-1
1.2 Other System Manuals	1-1
1.3 Manual Organization	1-1
2.0 REFERENCES	2-1
2.1 Related Documents	2-1
2.1.1 Specifications	2-1
2.1.2 Standards	2-1
2.1.3 Other Publications	2-2
2.2 Acronyms and Abbreviations	2-4
3.0 SYSTEM OVERVIEW	3-1
3.1 Purpose of the Schema Manager Software	3-1
3.2 The Metamodel	3-2
3.3 Physical Representation	3-6
4.0 INTERACTIVE INTERFACE	4-1
4.1 Exit Schema Manager	4-2
4.2 Retrieve Model From Disk	4-3
4.3 Create	4-4
4.3.1 Create Entity	4-6
4.3.2 Create Defined Type	4-7
4.3.3 Create Supertype	4-8
4.3.4 Create Global Attribute	4-9
4.3.5 Create Subschema	4-10
4.3.6 Create Class	4-11
4.3.7 Other Supporting Menus	4-12
4.4 Update	4-26
4.4.1 Update Entity	4-28
4.4.2 Update Defined Type	4-29
4.4.3 Update Supertype	4-31
4.4.4 Update Global Attribute	4-32
4.4.5 Update Subschema	4-34
4.4.6 Update Class	4-35
4.4.7 Other Supporting Menus	4-36

LIST OF TABLES

Table 1-1 Manual Organization	1-2
3-1 Elements of the Metamodel Used by the Schema Manager Software	3-4
3-2 Physical Schema Order of Attributes in the ADB	3-7
3-3 Physical Representation of the Primitive Data Types	3-8
6-1 Accessing REPORT features through Batch Interface	6-1
6-2 Batch Interface Keywords	6-2

LIST OF FIGURES

Figure 3-1 Metamodel for the Schema Manager.	3-3
4-1 Schema Manager Main Menu.	4-1
4-2 Replace Option Menu	4-2
4-3 Creating a New Model.	4-3
4-4 Create Menu	4-5
4-5 Create Entity	4-6
4-6 Create Defined Type	4-7
4-7 Create Supertype.	4-8
4-8 Create Global Attribute	4-9
4-9 Create Subschema.	4-10
4-10 Create Class Name and Kind Number.	4-11
4-11 Create Array	4-13
4-12 Create Attribute	4-14
4-13 Create Class Members	4-15
4-14 Create Enumeration	4-16
4-15 Create Integer	4-17
4-16 Create List.	4-18
4-17 Create Pointer	4-19
4-18 Create Real.	4-20
4-19 Create Set	4-21
4-20 Create String.	4-22
4-21 Create/Reference Supertype	4-23
4-22 Display List	4-24
4-23 List Members	4-25
4-24 Update Menu.	4-27
4-25 Update Entity.	4-28
4-26 Update Defined Type.	4-29
4-27 Update Supertype	4-31
4-28 Update Global Attribute.	4-32
4-29 Update Subschema	4-34
4-30 Update Class	4-35
4-31 Add Attribute.	4-37
4-32 Add Enumeration Item	4-38
4-33 Update Approval.	4-39
4-34 Update Array	4-40
4-35 Update Attribute	4-42
4-36 Update Attribute Date.	4-43

LIST OF FIGURES (Continued)

Figure 5-12 Conceptual Schema Report - Subschema Index.	5-9
5-15 Physical Subschema Report, Example 1.	5-18
5-16 Physical Subschema Report, Example 2.	5-19
5-17 Physical Subschema Report, Indices.	5-20
7-1 Model Query Main Menu	7-1
7-2 Dataset Name For Batch Output	7-2
7-3 Model Query Batch Menu	7-3
7-4 Batch Entity Menu	7-4
7-5 No Entity Found	7-5
7-6 Model Query Interactive Menu	7-6
7-7 Interactive Entity Menu	7-7
7-8 Display Attributes	7-8
7-9 Select Constituent	7-9
7-10 No Constituents	7-10
7-11 Select User	7-11
7-12 No Users	7-12
7-13 No Entity Found	7-13
7-14 Select Dataset Name for Model Query	7-14
7-15 Data Dictionary Data File	7-15
7-16 Data Dictionary Index File	7-16
7-17 Model Query Utility Batch Report	7-18

UM560130002
22 December 1987

SECTION 1

INTRODUCTION

This User Manual provides a guide for use of the Schema Manager Software. This software was developed for the Geometric Modeling Applications Interface Program (GMAP), Air Force Contract F33615-85-C-5122, and enhanced for the Product Definition Data Interface (PDDI) project, developed under Air Force Contract F33615-82-C-5036.

1.1 IDENTIFICATION

Capabilities documented in this manual include:

- Interactive Interface
- Generated Reports and Files
- Batch Interface
- Model Query Utility

The Schema Manager software presently operates on an IBM mainframe computer.

1.2 OTHER SYSTEM MANUALS

The associated Operator's Manual OM560130000B describes the system operations and installation procedures. The Operator's Manual is intended for use by computer operators and programming personnel.

1.3 MANUAL ORGANIZATION

This User Manual is divided into six sections. The content of each section is listed in Table 1-1.

SECTION 2

REFERENCES

This section identifies reference documentation applicable to the Schema Manager Software and this User Manual.

2.1 RELATED DOCUMENTS

Reference sources include specifications, Standards Documents, and other publications.

2.1.1 Specifications:

DOD-D-1000B	Drawings, Engineering and Associated Lists
MIL-D-5840	Requirements for Data, Engineering and Technical Reproduction

2.1.2 Standards:

ANSI Y14.5	Dimensioning and Tolerancing
ANSI Y14.26M	Digital Representation
	Communication of Production
	Definition Data
ANSI B46.1	Surface Texture (Surface Roughness, Waviness and Lay)
ANSI B92.1	Involute Splines and Inspection
DOD-STD-100C	Engineering Drawing Practices
MIL-STD-9	Screw Thread Conventions and Methods of Specifying
MIL-STD-12	Abbreviations for Use on Drawings, Specifications, Standards and in Technical Documents
IDS150120000C	ICAM Documentation Standards
IEEE STD 829	Standards for Software Test Documentation
ISO/TC184/SC4/WG1	4.2:2 The Step File Structure (Working Paper Version 1.0 28 April 1981)

UM560130002
22 December 1987

SRD560130000	System Requirement Document
SDS560130000	System Design Specification Document
SS 560130100	System Specification Document
SS 560130200	System Specification Document - Draft Standard
STP560130000	System Test Plan
STR560130000	System Test Report
PS 560130000	Product Specification
OM 560130000	Operator's Manual
UM 560130000	User's Manual (Access Software)
UM 560130000	User's Manual (Translator)

SECTION 3

SYSTEM OVERVIEW

The three major functions of the Schema Manager software include the ability to:

- model a concrete conceptual schema.
- transform a concrete conceptual schema into a physical schema suitable for the Working Form of the Model Access Software (MAS).
- generate subschema forms of the physical schema for use by application programs at the time of compiling and/or at the time of running.

3.1 PURPOSE OF THE SCHEMA MANAGER SOFTWARE

Each of these three major functions identified above are further explained in the following paragraphs.

The concrete conceptual schema is the logical view of data called the "Conceptual Model" in the ANSI/SPARC three-schema approach and the "Schema" in the CODASYL 78 approach. It contains an unambiguous set of requirements for the data objects (as opposed to an abstract conceptual schema which may be incomplete or contain ambiguity).

The physical schema is the implementation view of data called the "Internal Model" in the ANSI/SPARC three-schema approach and the "Storage Schema" in the CODASYL 78 approach. It contains the resolution of the requirements for the data objects (such as size, boundary alignment, and location).

The subschema forms of the physical schema are the application views of data called the "External Model" in the ANSI/SPARC three-schema approach and the "Sub-Schema" in the CODASYL 78 approach. The forms of the physical schema generated by the schema manager include:

- o a Pascal language "Include" file of types and constants
- o a report of the physical definitions for general use
- o a GMAP/PDDI Data Dictionary
- o a Run-Time Subschema

These forms of the physical schema are explained in detail in the section of this manual titled GENERATED REPORTS AND FILES.

The content of the conceptual schema is based on the EXPRESS information modeling language, and is an extension of the GMAP/PDDI metamodel. This is further explained below in the section titled THE METAMODEL.

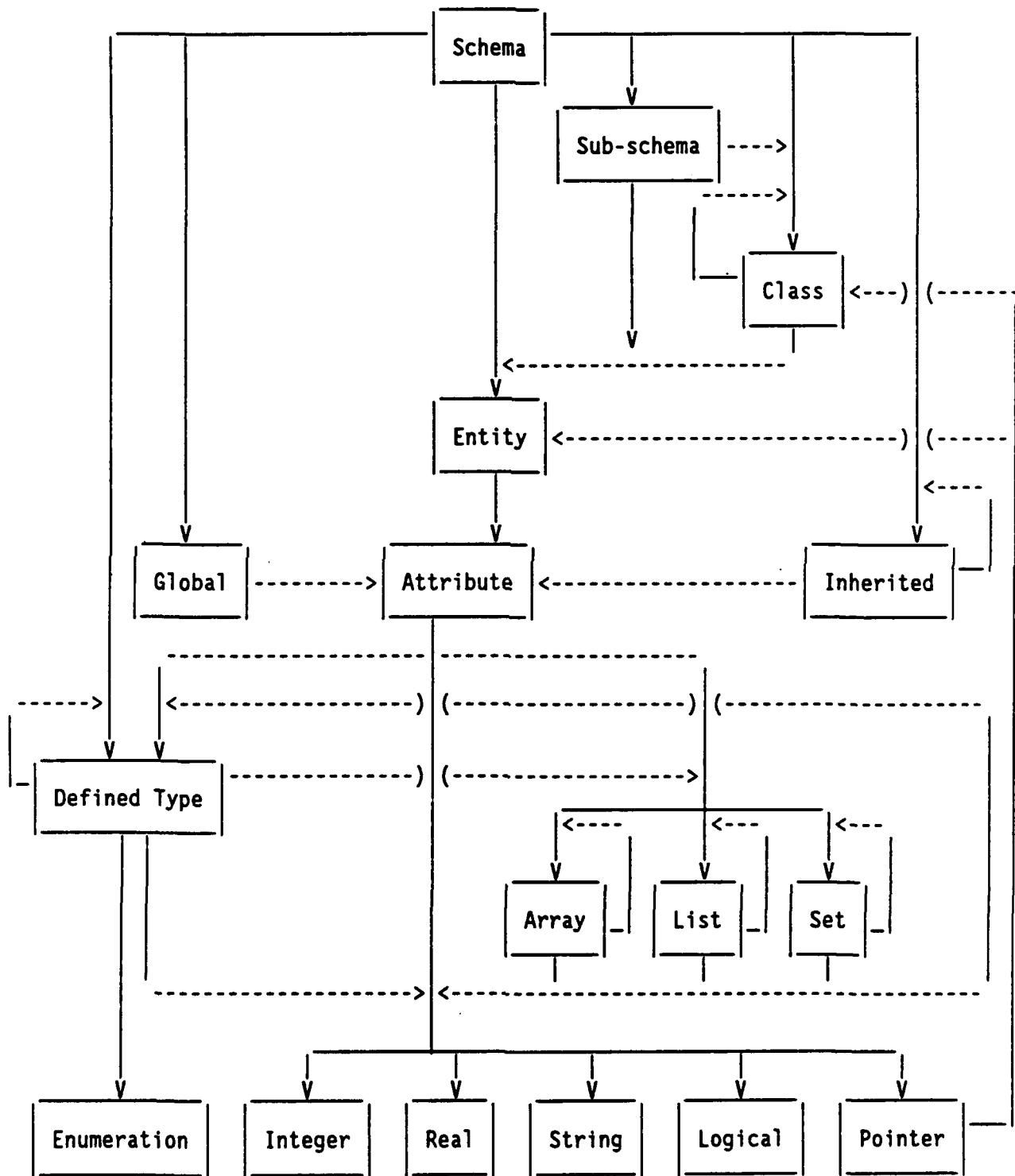


Figure 3-1 Metamodel for the Schema Manager

Table 3-1 (Continued)
Elements of the Metamodel used by the Schema Manager Software

<u>COMPLEX PRIMITIVE</u>	
ENUMERATION	An ordered list of possible values. The number of values is its cardinality. The position of a specific value is its ordinality.
<u>AGGREGATION</u>	
ARRAY	An ordered collection of elements of a single primitive data type, which is fixed in size. Each dimension of an array is defined by a lower bound and an upper bound. These specify the number of elements in that dimension, and map to the first and last positions.
LIST	An ordered collection of elements of a single primitive data type, which is variable in size. The apparent size of the list is bounded by minimum and maximum occurrences.
SET	An unordered collection of elements of a single primitive data type, which is variable in size. The apparent size of the list is bounded by minimum and maximum occurrences. (This data type should not be confused with the keyword "set" in the Pascal language which defines a construct that can be used only to inquire about the presence or absence of a member.)
DEFINED TYPE	An alias for a primitive, complex primitive or aggregation data type.
CLASS	A collection of entities, or classes of entities.
SUB-SCHEMA	A collection of entities, or classes of entities, which defines the scope of a physical schema. (Note that in order to ensure a complete definition, when a class is a member of a sub-schema, its members are implicitly included, and when an entity is a member of a sub-schema, its constituents are implicitly included.)
SCHEMA	All the data in the schema model.

- attributes that are aligned on half word boundaries are assigned third (i.e., two byte INTEGERS); within the boundary alignment class they are assigned to locations by the entry order within the group
- attributes that are aligned on bytes are assigned fourth (i.e., one byte INTEGERS, LOGICALs, ENUMERATIONS, STRINGs); within the boundary alignment class they are assigned to locations by the entry order within the group

The physical schema order of attributes in the ADB are summarized in Table 3-2.

Table 3-2 PHYSICAL SCHEMA ORDER OF ATTRIBUTES IN THE ADB		
MAS required :	KIND LENGTH SYSUSE	
global :	double words : entry order full words : entry order half words : entry order bytes : entry order	
top level inherited :	double words : entry order full words : entry order half words : entry order bytes : entry order	
	⋮	
bottom level inherited :	double words : entry order full words : entry order half words : entry order bytes : entry order	
local :	double words : entry order full words : entry order half words : entry order bytes : entry order	

The physical representation of an array of pointers makes use of a pseudo-entity called the ARRAY_ENTITY. Whereas an attribute with a data type of pointer is represented by an entry in the constituent list referring directly to the constituent, for an array of pointers the entry in the constituent list refers to an ARRAY_ENTITY, whose "constituent list" is the array of direct references to the constituents. For a two-dimensional array, a first level ARRAY_ENTITY refers to a second level group of ARRAY_ENTITIES, one for each "row" of the array. For an n-dimensional array there are n-levels of ARRAY_ENTITIES with the n-th level containing the direct references to the constituents. This approach allows applications programs to navigate multi-dimensional arrays of constituents with the same MAS functions used for navigating constituents not in an array.

Please note that the pseudo-entity ARRAY_ENTITY (KIND = 1100) should be used only for the purpose of representing arrays of pointers. It is usually handled differently from true entity definitions, and should therefore not be used for any other purpose. The physical representation of the ARRAY_ENTITY is automatically generated by the Schema Manager software. The list of eligible KINDS defined for the ARRAY_ENTITY in the PDDI/GMAP Data Dictionary includes all of the entity KINDS and class KINDS referred to in any definition of an attribute which is an "array of pointers".

List and set have been temporarily implemented with the same physical representation as the array. Currently the only effect of using these data types is that the "minimum occurrences" will appear in the PDDI/GMAP Data Dictionary entry for the attribute.

SECTION 4

INTERACTIVE INTERFACE

This section identifies and explains the menus available within the Interactive Interface of the Schema Manager Software. The commands available from the Main Menu include: exit Schema Manager, retrieve model from disk, create, update, review, generate reports, and file model to disk. Figure 4-1 illustrates the Schema Manager Main Menu.

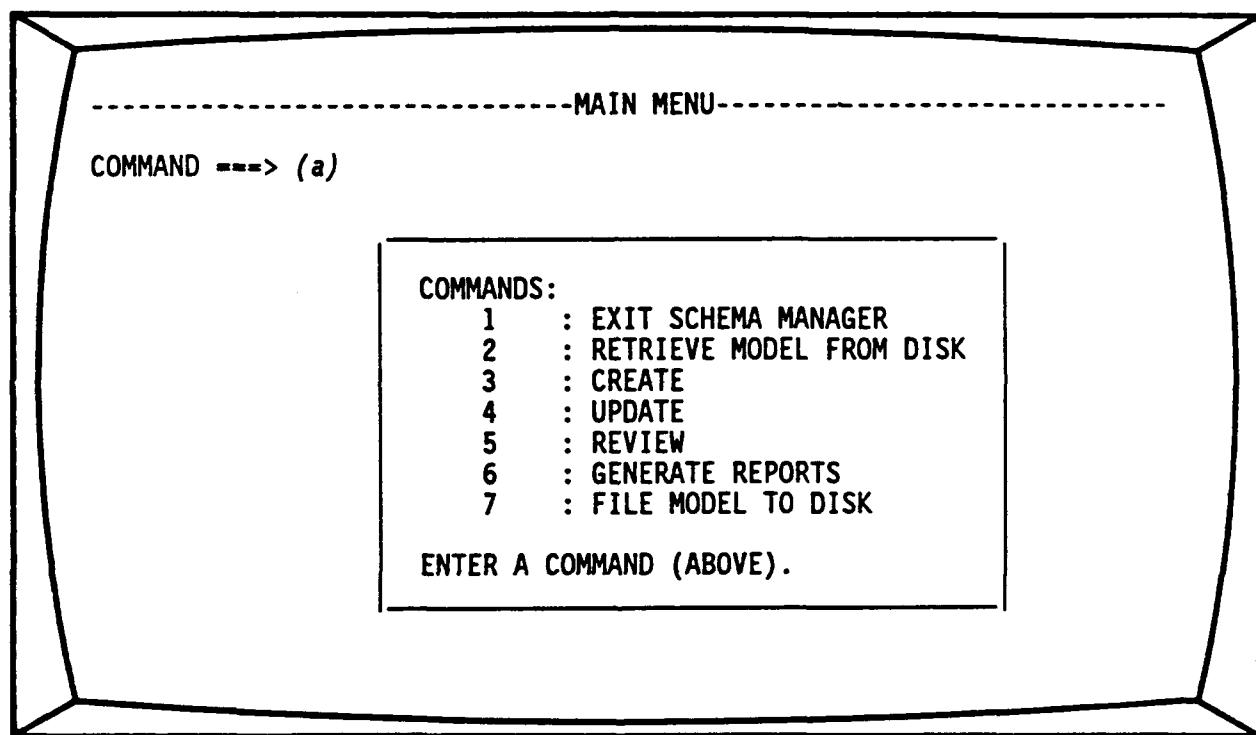


Figure 4-1 SCHEMA MANAGER MAIN MENU

Menu Description:

- (a) Select command 1 to exit from the Schema Manager. The REPLACE OPTION MENU is displayed.
- Select command 2 to restore a model from a file to working form.
- Select command 3 to display the CREATE MENU.
- Select command 4 to display the UPDATE MENU.
- Select command 5 to display the REVIEW MENU.
- Select command 6 to display the REPORT MENU.
- Select command 7 to file a model in working form to disk.

4.2 RETRIEVE MODEL FROM DISK

After selecting command 2, Retrieve Model From Disk from the MAIN MENU, the Schema Manager displays one of the following messages in the top right corner of the display screen:

- Model Retrieved
- No Model Retrieved

If a model has not been retrieved, the Creating a New Model screen, illustrated in Figure 4-2, will be displayed after selecting command 3, Create, from the MAIN MENU.

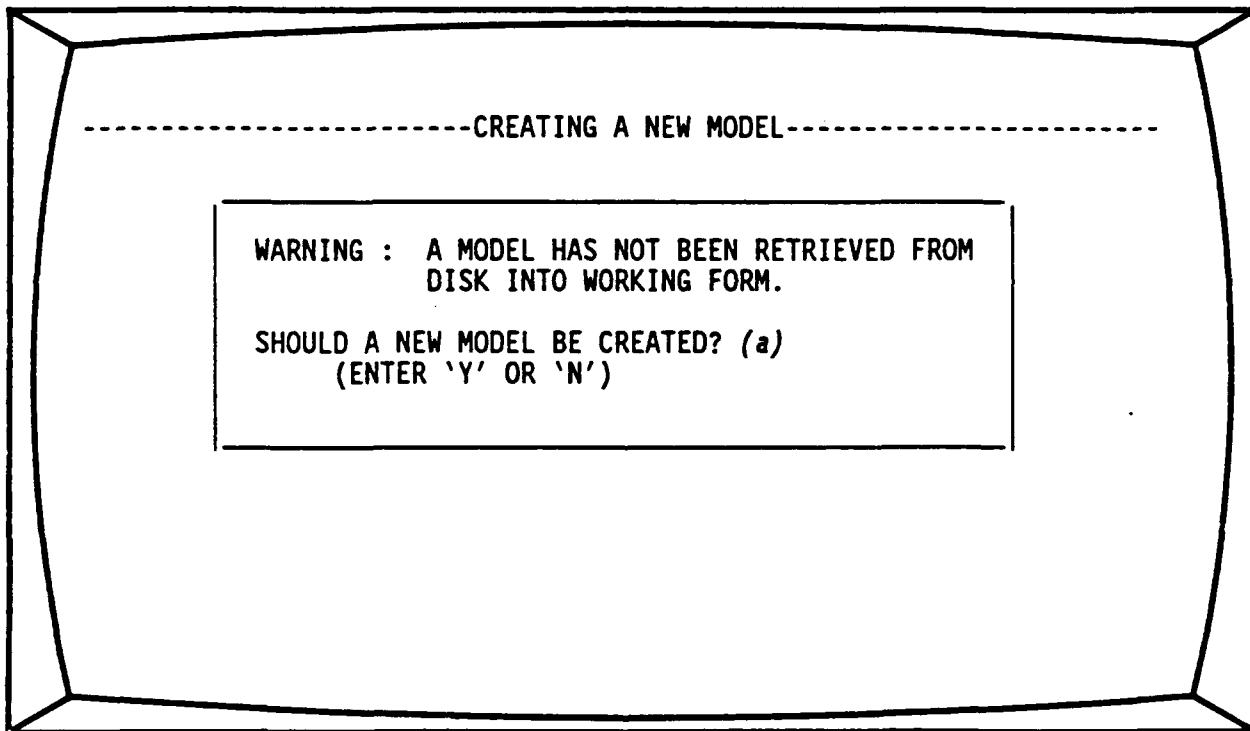


Figure 4-3 Creating a New Model

Menu Description:

(a) Enter 'Y' to display the CREATE MENU.
Enter 'N' to redisplay the MAIN MENU.

The main CREATE MENU can be accessed by selecting command 3, Create, from the MAIN MENU. The CREATE MENU is illustrated in Figure 4-4.

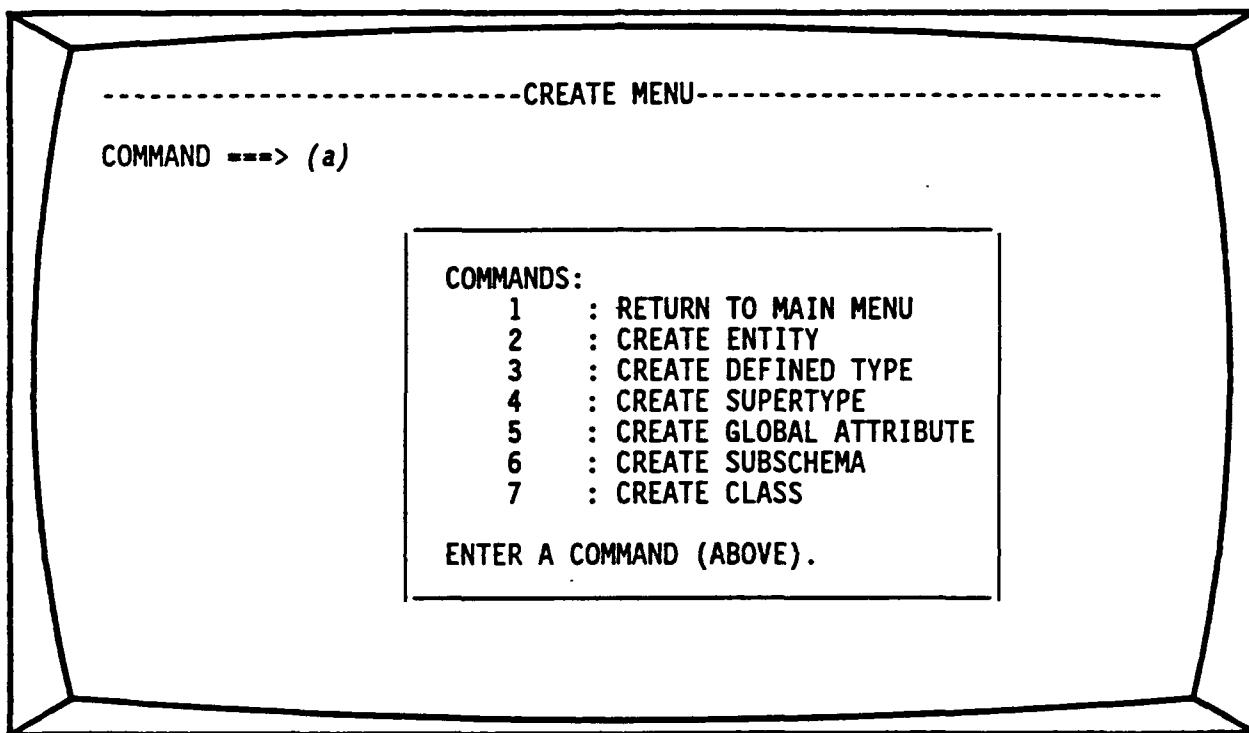


Figure 4-4 Create Menu

Menu Description:

(a) Select command 1 to redisplay the MAIN MENU.
Select command 2 to display the CREATE ENTITY MENU.
Select command 3 to display the CREATE DEFINED TYPE MENU.
Select command 4 to display the CREATE SUPERTYPE MENU.
Select command 5 to display the CREATE GLOBAL ATTRIBUTE MENU.
Select command 6 to display the CREATE SUBSCHEMA MENU.
Select command 7 to display the CREATE CLASS NAME AND KIND NUMBER MENU.

4.3.2 CREATE DEFINED TYPE

The **Create Defined Type** screen can be displayed through various create functions. One method of accessing the **Create Defined Type** screen is to select command 3, **Create Defined Type**, from the **CREATE MENU**, the screen illustrated in Figure 4-6 is displayed.

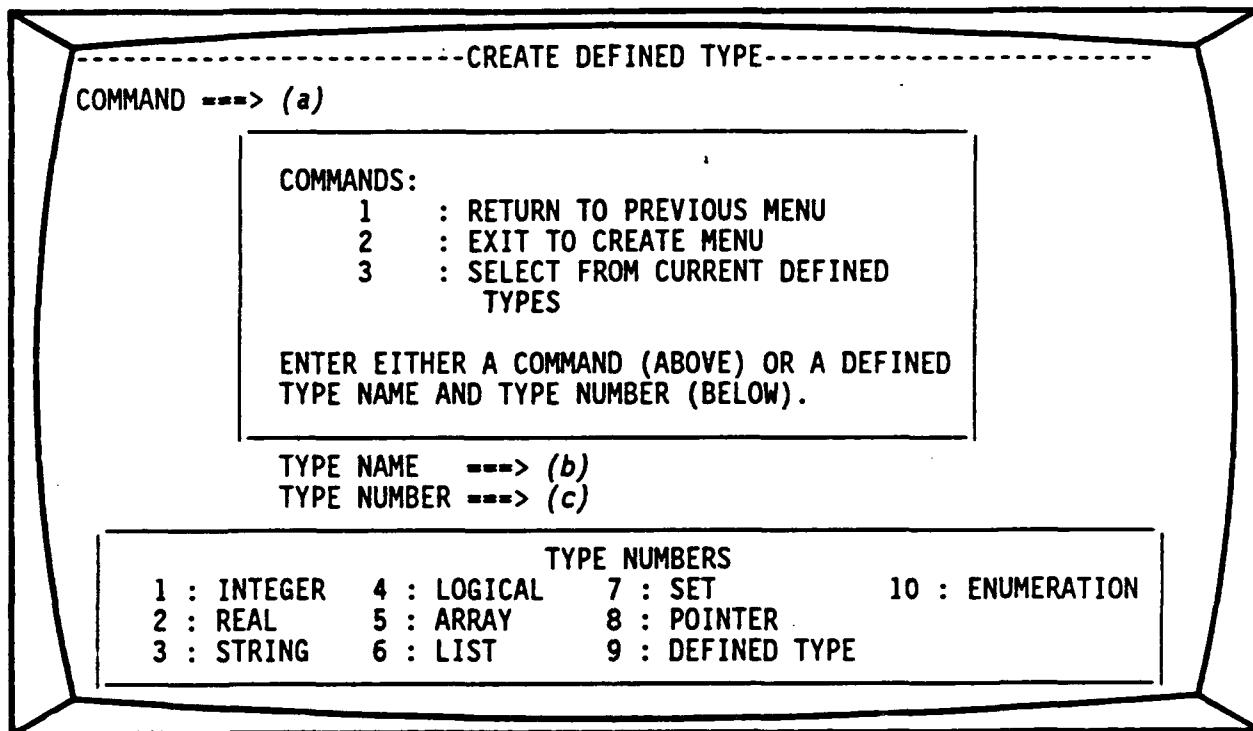


Figure 4-6 Create Defined Type

Menu Description:

- (a) Select command 1 to redisplay the previous menu.
Select command 2 to redisplay the **CREATE MENU**.
Select command 3 to display the modeled defined types, one of which may be selected. In choosing this command a new defined type is not created. The **DISPLAY LIST MENU** is displayed.
- (b) Enter the defined type name.
- (c) Enter the defined type number (1-10).
After a defined type name and number are accepted, the appropriate create type menu is displayed. Possible create menus to be displayed include:

CREATE INTEGER
CREATE REAL
CREATE STRING

CREATE ARRAY
CREATE LIST
CREATE SET

CREATE POINTER
CREATE DEFINED TYPE
CREATE ENUMERATION

UM560130002
22 December 1987

4.3.4 CREATE GLOBAL ATTRIBUTE

When selecting command 5, Create Global Attribute from the CREATE MENU, the screen illustrated in Figure 4-8 is displayed.

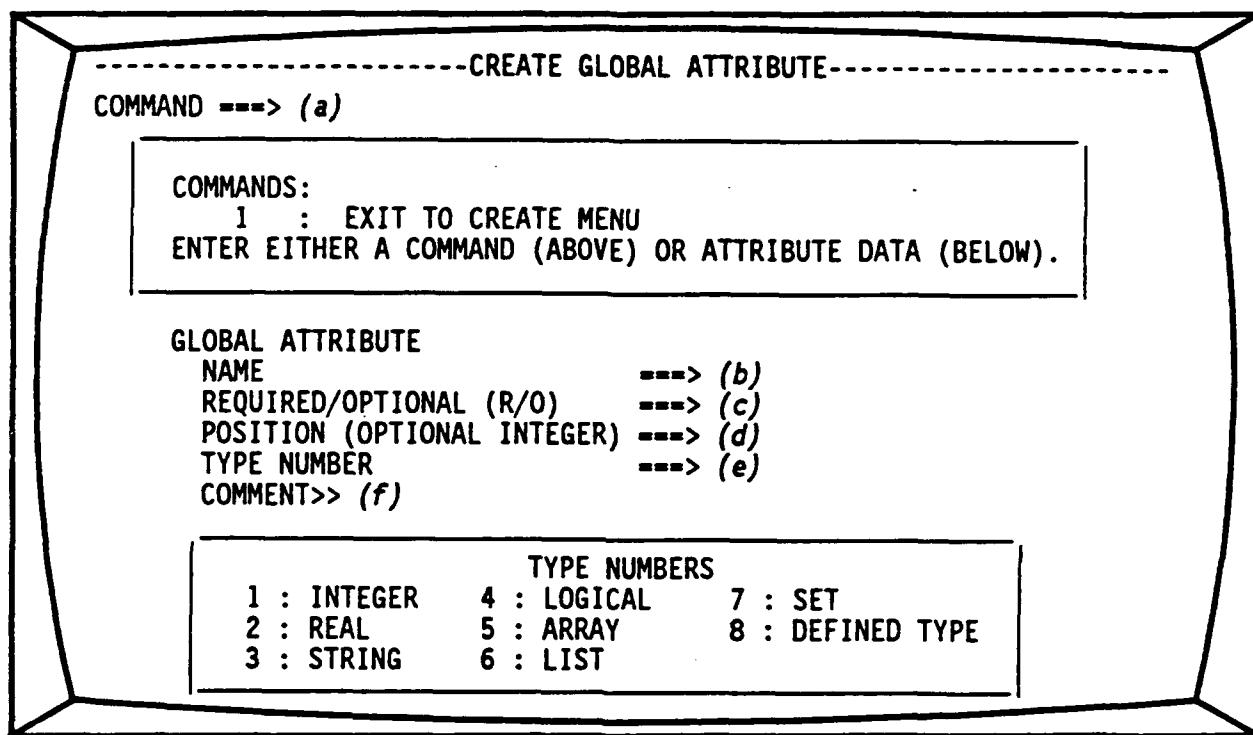


Figure 4-8 Create Global Attribute

Menu Description:

- (a) Select command 1 to redisplay the CREATE MENU.
- (b) Enter the name of the global attribute to be included in the model.
- (c) Enter 'R' to select "required" or '0' to select "optional". The software will default to 'R'.
- (d) Enter the user specified physical position number of the global attribute in the ADB. (This entry is optional.)
- (e) Enter the attribute type number (1-8).
After the global attribute data is accepted, the appropriate create type menu is displayed. Possible create menus to be displayed include:

CREATE INTEGER	CREATE ARRAY	CREATE POINTER
CREATE REAL	CREATE LIST	CREATE DEFINED TYPE
CREATE STRING	CREATE SET	CREATE ENUMERATION
- (f) Enter remarks as appropriate (maximum 50 characters). The comments will be saved and will appear on the Conceptual Schema Report and the Pascal Include File.

4.3.6 CREATE CLASS NAME AND KIND NUMBER

The screen can be displayed through various create functions. One method of accessing the Create Class Name and Kind Number screen is to select command 4, **Create a Class Within A Class**, from the CREATE CLASS MEMBERS MENU. The screen illustrated in Figure 4-10 is displayed.

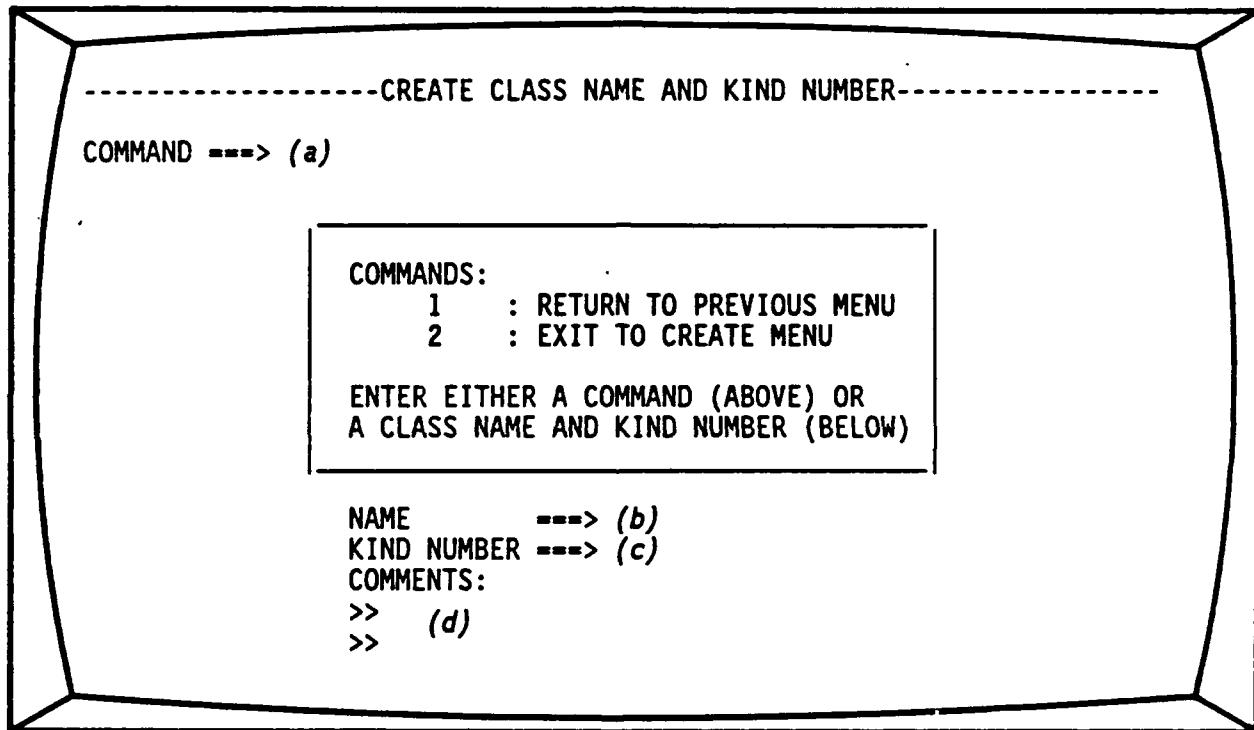


Figure 4-10 Create Class Name and Kind Number

Menu Description:

- (a) Select command 1 to redisplay the previous menu.
Select command 2 to redisplay the create menu.
- (b) Enter the class name.
- (c) Enter the class kind number.
- (d) Enter remarks as appropriate (maximum 150 characters). The comments will be saved and will appear on the Conceptual Schema Report and the Pascal Include File.

After the class name, kind number, and comments have been accepted, the CREATE CLASS MEMBERS MENU is displayed.

Create Array

The screen illustrated in Figure 4-11 displays the Create Array option.

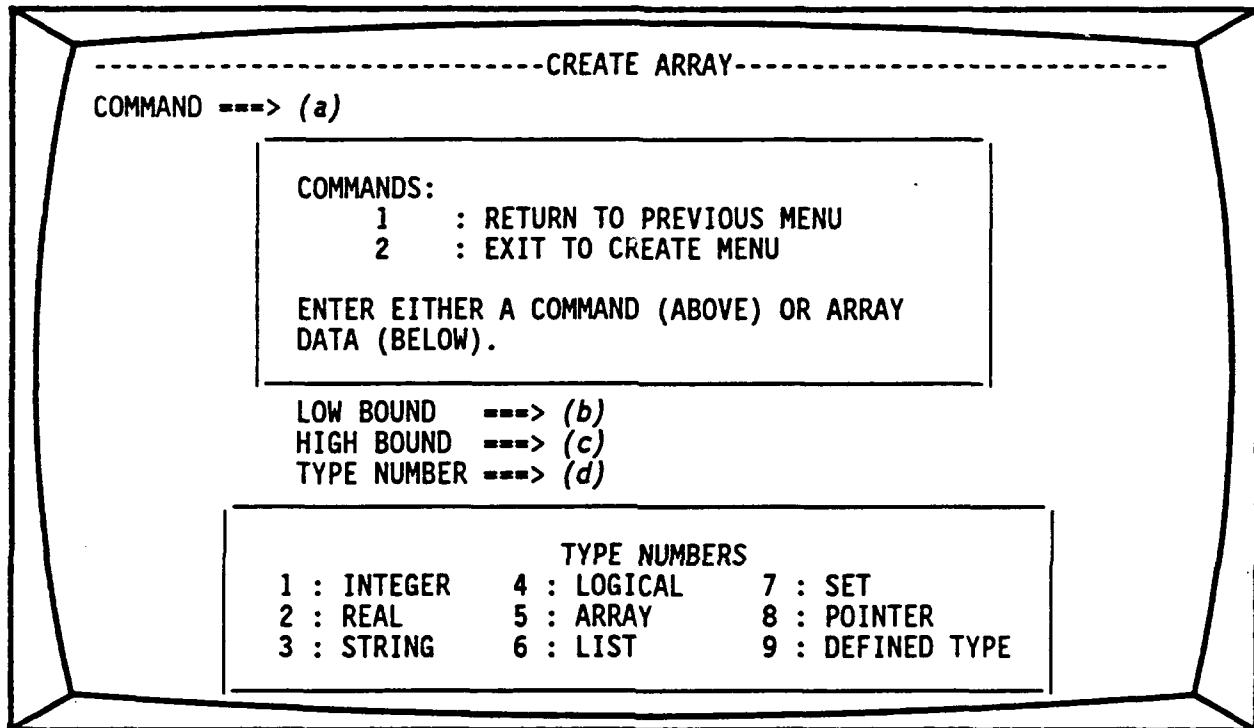


Figure 4-11 Create Array

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the CREATE MENU.
- (b) Enter the array lower bound.
- (c) Enter the array upper bound.
- (d) Enter the array type number (1-9).
After the array data is accepted, the appropriate create type menu is displayed. Possible create menus to be displayed include:

CREATE INTEGER
CREATE REAL
CREATE STRING

CREATE REAL
CREATE ARRAY
CREATE LIST

CREATE SET
CREATE POINTER
CREATE DEFINED TYPE

Create Class Members

After entering a class name and kind number on the CREATE CLASS NAME AND KIND NUMBER MENU, the screen illustrated in Figure 4-13 is displayed.

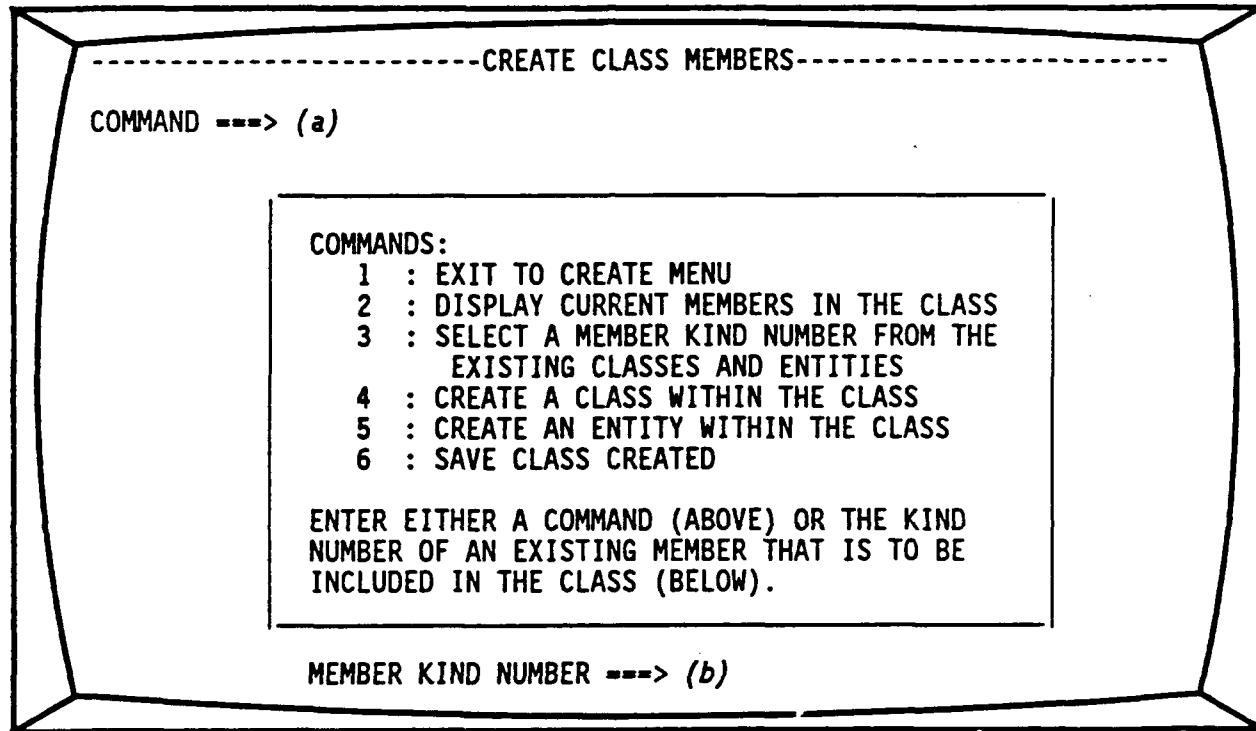


Figure 4-13 Create Class Members

Menu Description:

- (a) Select option 1 to redisplay the CREATE MENU.
Select option 2 to display the current entity and class members of the class. The LIST MEMBERS MENU is displayed.
Select option 3 to display the eligible entities and classes which may be selected to be members of the class. The DISPLAY LIST MENU is displayed.
Select option 4 to create a class member within the current class. The CREATE CLASS NAME AND KIND NUMBER MENU is displayed.
Select option 5 to create an entity member within the current class. The CREATE ENTITY MENU is displayed.
Select option 6 to model the class created. The CREATE MENU is redisplayed.
- (b) Enter the kind number of a modeled class or entity that is to be made a member of the class.

Create Integer

The screen illustrated in Figure 4-15 displays the Create Integer option.

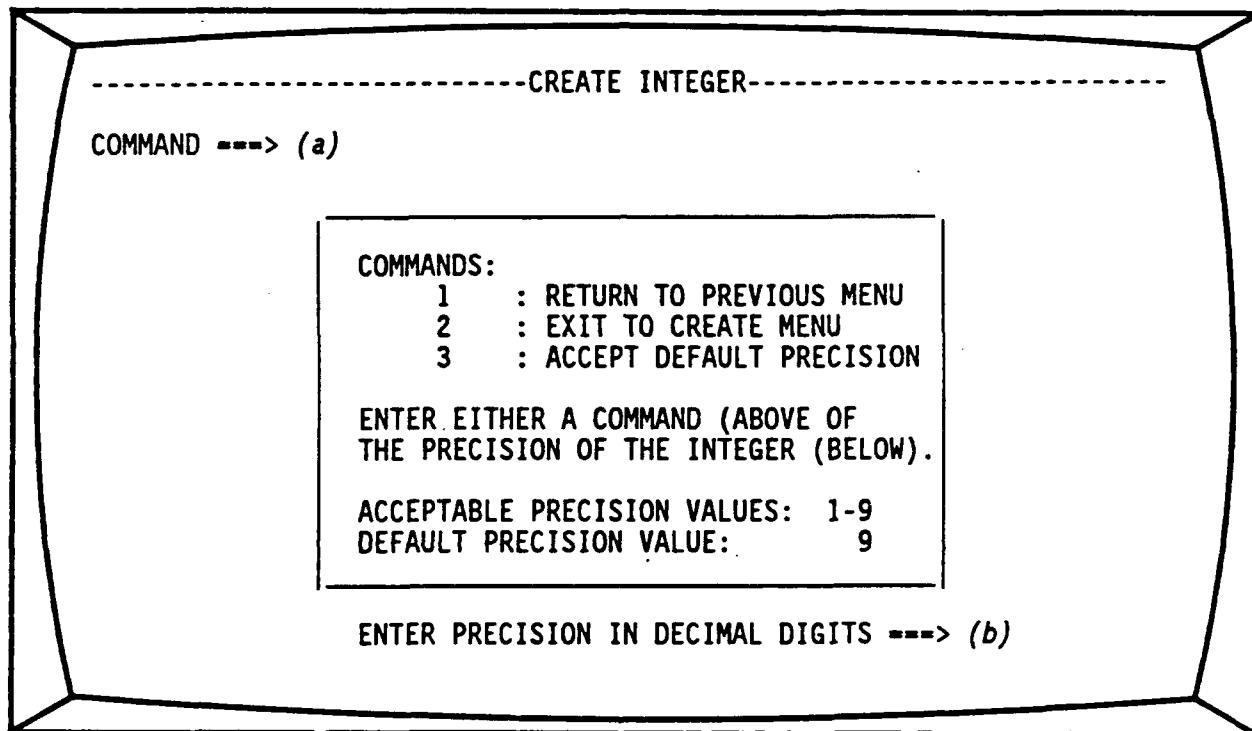


Figure 4-15 Create Integer

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the CREATE MENU.
Select option 3 to accept the default precision. The previous menu is redisplayed.
- (b) Enter the integer precision in decimal digits.

Create Pointer

The screen illustrated in Figure 4-17 displays the Create Pointer option.

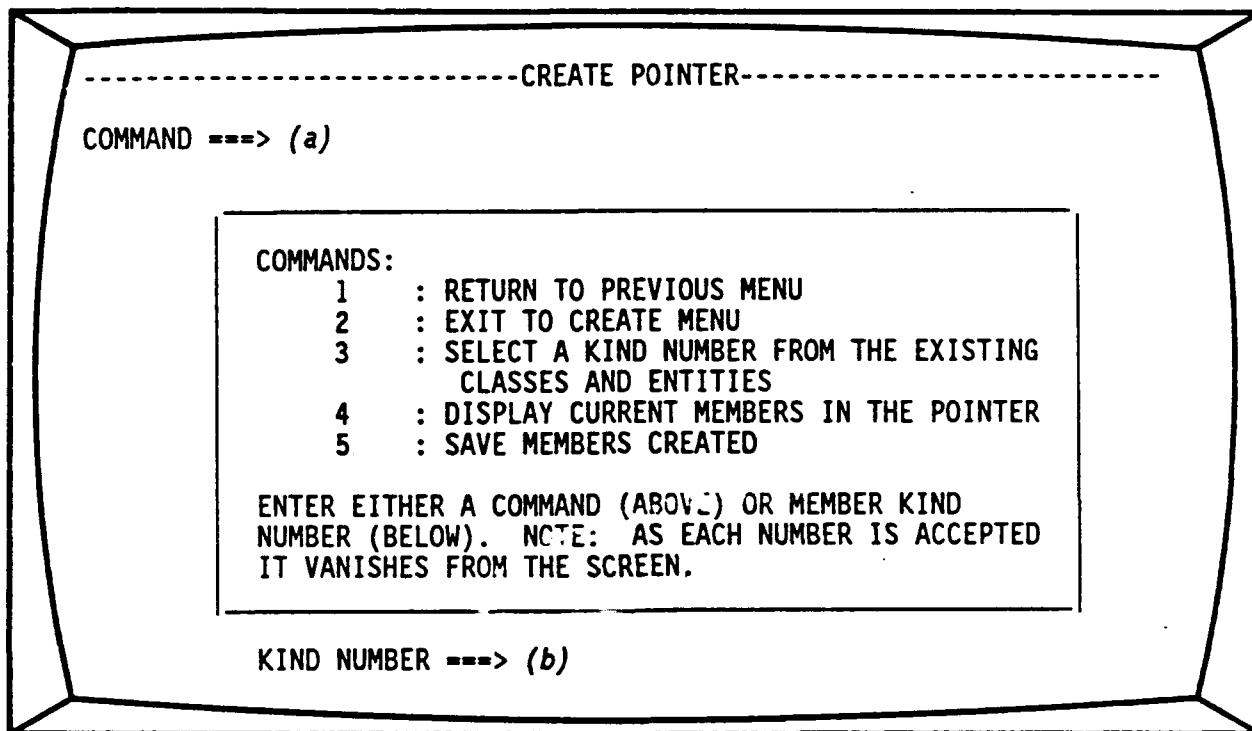


Figure 4-17 Create Pointer

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the CREATE MENU.
Select option 3 to display the eligible entities and classes which may be selected to be referenced by the pointer. The DISPLAY LIST MENU is displayed.
Select option 4 to display the current member entities and classes referenced by the pointer. The LIST MEMBERS MENU is displayed.
Select option 5 to model the pointer created. The previous menu is redisplayed.
- (b) Enter the kind number of the entity or class that is to be referenced by the pointer.

Create Set

The screen illustrated in Figure 4-19 displays the Create Set option.

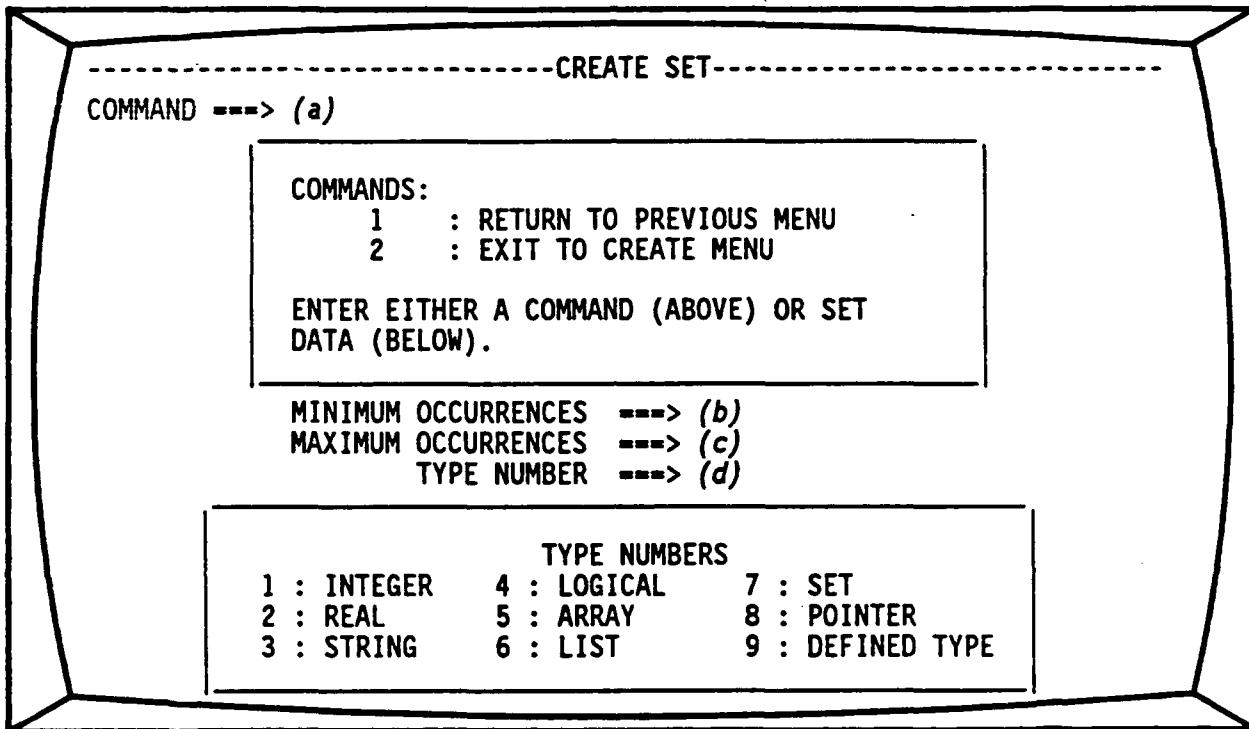


Figure 4-19 Create Set

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the CREATE MENU.
- (b) Enter the minimum number of occurrences for the set.
- (c) Enter the maximum number of occurrences for the set.
- (d) Enter the list type number (1-9).

After the set data is accepted, the appropriate create type menu is displayed. Possible create menus to be displayed include:

CREATE INTEGER	CREATE ARRAY	CREATE POINTER
CREATE REAL	CREATE LIST	CREATE DEFINED TYPE
CREATE STRING	CREATE SET	

Create/Reference Supertype

The Create Supertype menu is illustrated in Figure 4-21.

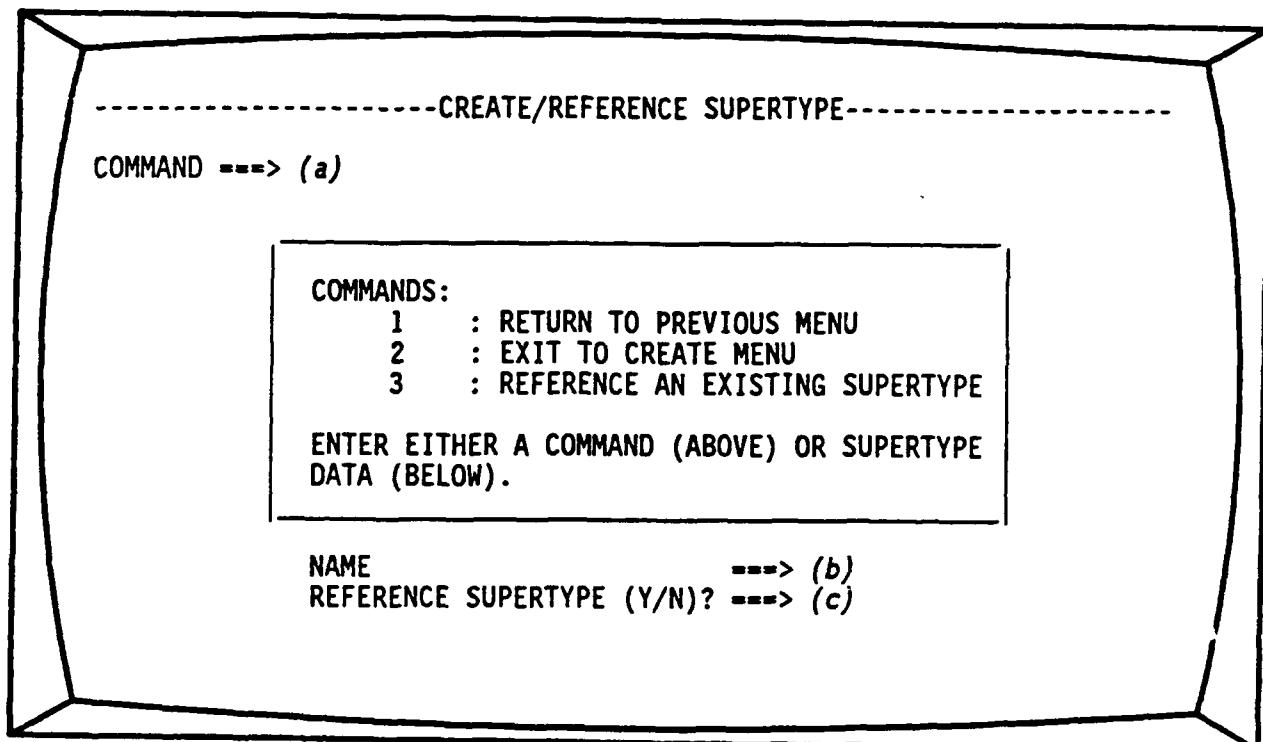


Figure 4-21 Create/Reference Supertype

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the CREATE MENU.
Select option 3 to display the SELECT SUPERTYPE MENU.
- (b) Enter the name of the supertype to be added to the model.
- (c) Enter 'Y' to display the CREATE/REFERENCE SUPERTYPE MENU.
Enter 'N' if this supertype does not refer to a parent supertype.

After the supertype name and supertype reference have been entered, the CREATE ATTRIBUTE MENU will be displayed.

List Members

The screen illustrated in Figure 4-23 displays the List Members option.

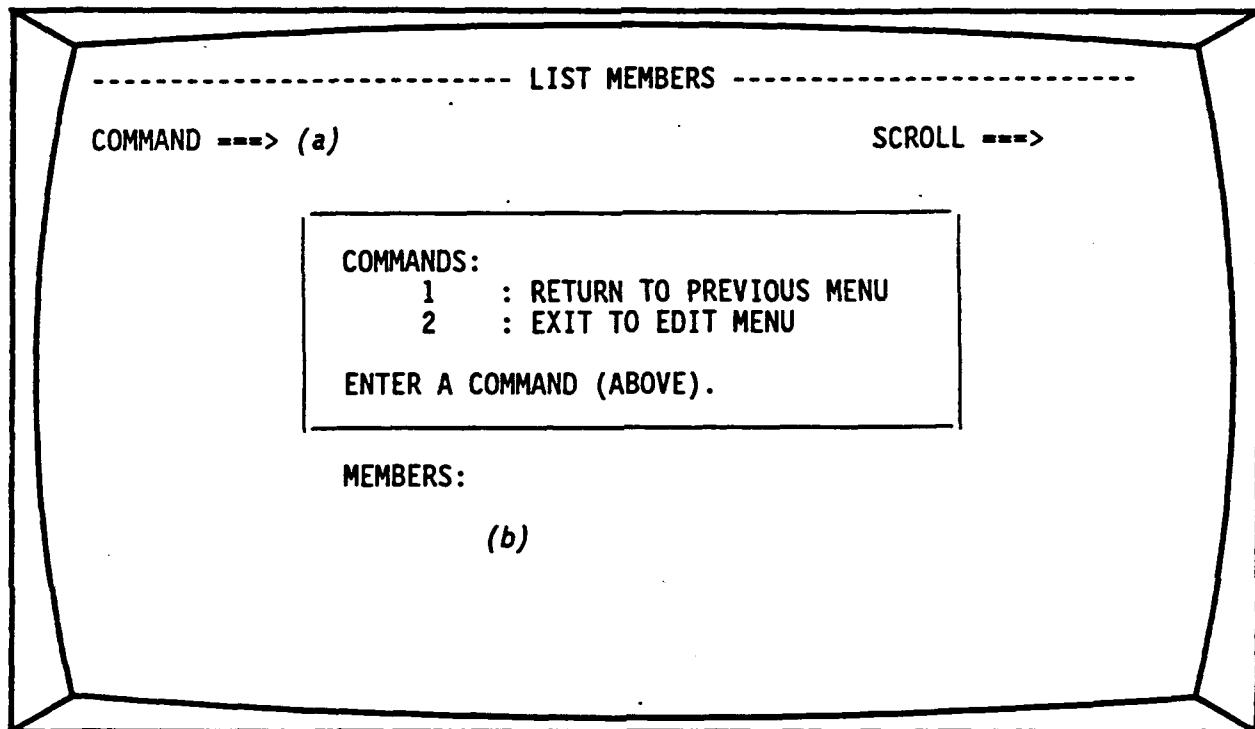


Figure 4-23 List Members

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the appropriate edit menu.
- (b) A list of members is displayed.

When selecting command 4, Update from the MAIN MENU, the screen illustrated in Figure 4-24 is displayed.

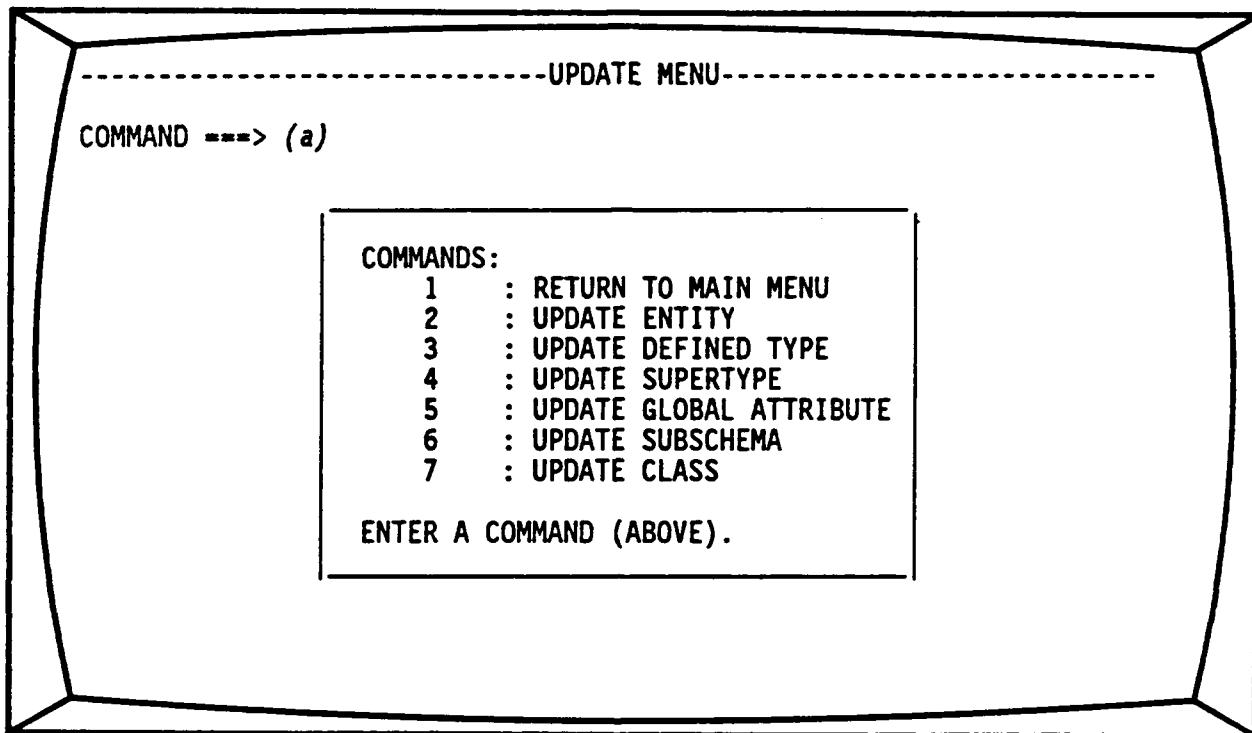


Figure 4-24 Update Menu

Menu Description:

(a) Select command 1 to redisplay the MAIN MENU.
Select command 2 to display the DISPLAY LIST MENU listing the modeled entities.
Select command 3 to display the DISPLAY LIST MENU listing the modeled defined types.
Select command 4 to display the DISPLAY LIST MENU listing the modeled supertypes.
Select command 5 to display the DISPLAY LIST MENU listing the modeled global attributes.
Select command 6 to display the DISPLAY LIST MENU listing the modeled subschemas.
Select command 7 to display the DISPLAY LIST MENU listing the modeled classes.

4.4.2 UPDATE DEFINED TYPE

The **Update Defined Type** screen can be displayed through various update functions. One method of accessing the **Update Defined Type** screen is to select command 3, **Update Defined Type**, from the **UPDATE MENU**. This screen is illustrated in Figure 4-26.

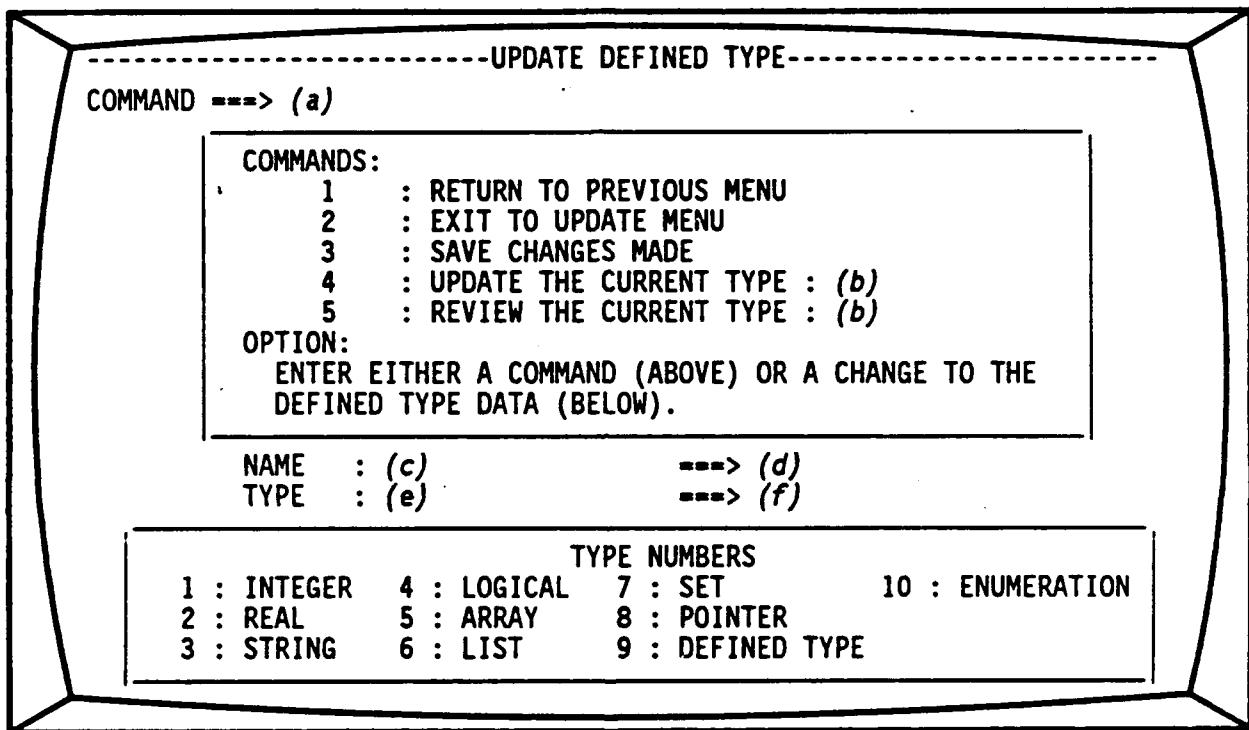


Figure 4-26 Update Defined Type

Menu Description:

(a) Select command 1 to redisplay the previous menu.
Select command 2 to redisplay the UPDATE MENU.
Select command 3 to accept any changes made to the defined type.
Select command 4 to display the appropriate update type menu.
Possible update menus to be displayed include:

UPDATE INTEGER	UPDATE ARRAY	UPDATE POINTER
UPDATE REAL	UPDATE LIST	UPDATE DEFINED TYPE
UPDATE STRING	UPDATE SET	UPDATE ENUMERATION

4.4.3 UPDATE SUPERTYPE

The **Update Supertype** screen can be displayed through various update functions. One method of accessing the **Update Supertype** screen is to select command 4, **Update Supertype**, from the **UPDATE MENU**. This menu illustrated in Figure 4-27.

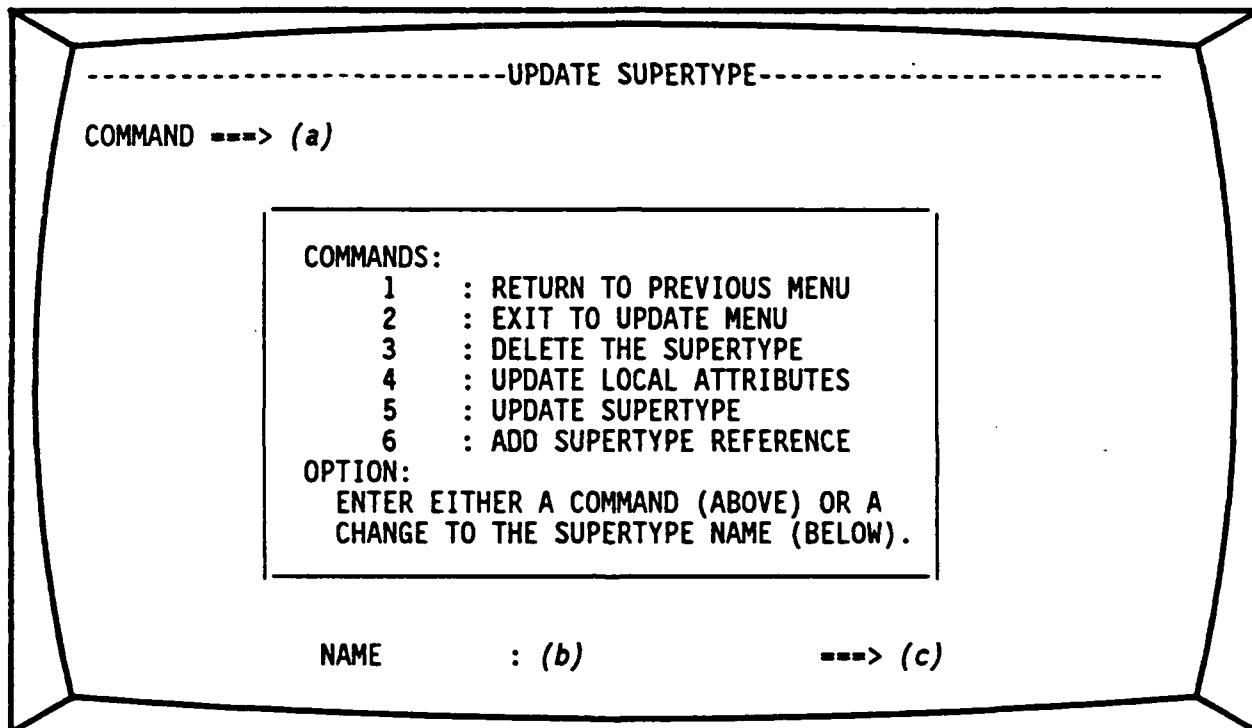


Figure 4-27 Update Supertype

Menu Description:

- (a) Select command 1 to redisplay the previous menu.
Select command 2 to redisplay the **UPDATE MENU**.
Select command 3 to delete the entity from the model. The **DISPLAY LIST MENU** will be redisplayed listing the remaining modeled entities.
Select command 4 to display the **UPDATE ATTRIBUTE MENU**.
Select command 5 to display the **UPDATE SUPERTYPE MENU**.
Select command 6 to display the **CREATE/REFERENCE SUPERTYPE MENU**.
- (b) The current supertype name is displayed.
- (c) The supertype name may be updated.

Menu Description: (Continued)

Select command 5 to display the appropriate review type menu. Possible review menus to be displayed include:

REVIEW INTEGER MENU REVIEW ARRAY MENU REVIEW DEFINED TYPE MENU
REVIEW REAL MENU REVIEW LIST MENU
REVIEW STRING MENU REVIEW SET MENU

Select command 6 to delete the global attribute from the model. The DISPLAY LIST MENU will be redisplayed listing the remaining modeled global attributes.

- (b) The current global attribute type is displayed.
- (c) The current global attribute name is displayed.
- (d) The global attribute name may be updated.
- (e) The current required/optional characteristic of the global attribute is displayed.
- (f) The required/optional characteristic of the global attribute may be updated.
- (g) The current user specified physical position of the global attribute in the ADB is displayed.
- (h) The user specified physical position number of the global attribute in the ADB may be updated.
- (i) The current global attribute type is displayed.
- (j) The global attribute type may be updated (1-9). If a new global type is entered, the appropriate update type menu is displayed.

Possible update menus to be displayed include:

UPDATE INTEGER MENU UPDATE ARRAY MENU UPDATE DEFINED TYPE MENU
UPDATE REAL MENU UPDATE LIST MENU
UPDATE STRING MENU UPDATE SET MENU

- (k) Update remarks as appropriate (maximum 50 characters). These remarks will be saved and will appear on the Conceptual Schema Report and the Pascal Include File.

4.4.6 UPDATE CLASS

The Update Class screen can be displayed through various update functions. One method of accessing the Update Class screen is to select command 7, Update Class, from the UPDATE MENU. This screen is illustrated in Figure 4-30.

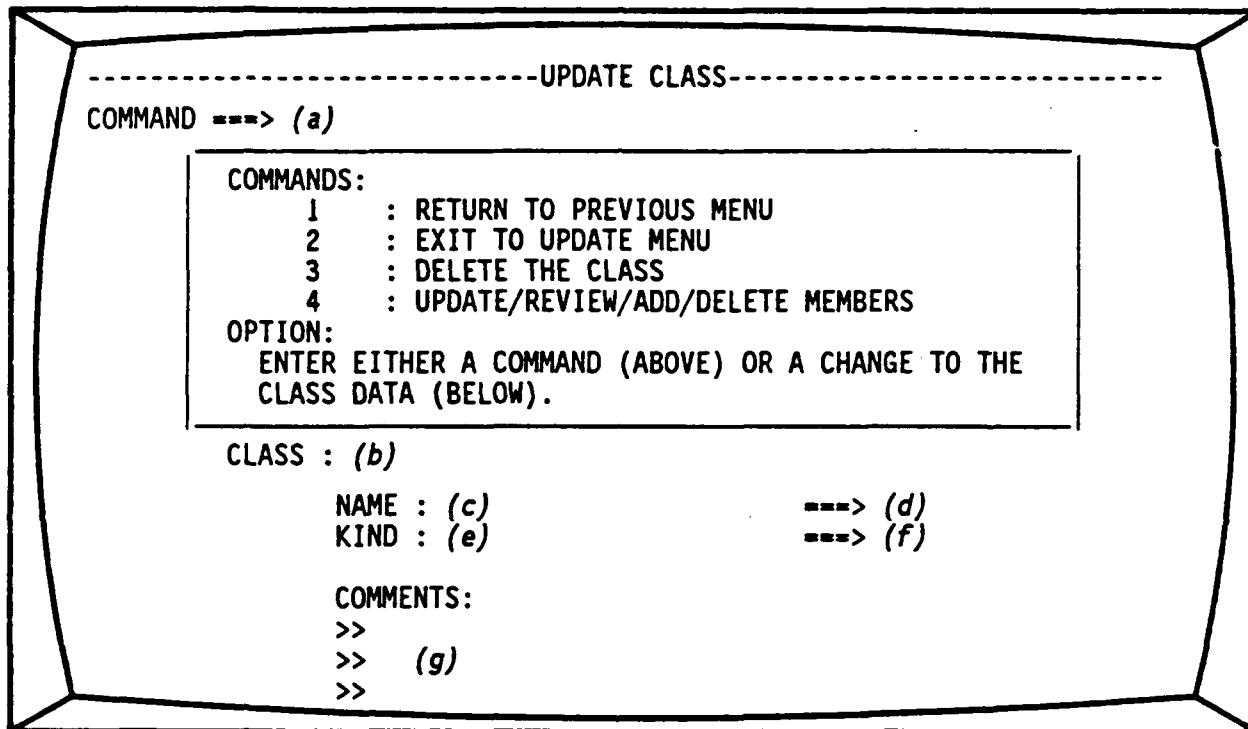


Figure 4-30 Update Class

Menu Description:

- (a) Select command 1 to redisplay the previous menu.
Select command 2 to redisplay the UPDATE MENU.
Select command 3 to delete the class from the model. The DISPLAY LIST MENU is redisplayed listing the modeled classes.
Select command 4 to update, review, add, or delete a class member.
The next UPDATE CLASS MENU is displayed.
- (b) The current class name is displayed.
- (c) The current class name is displayed.
- (d) The class name may be updated.
- (e) The current class kind number is displayed.
- (f) The class kind number may be updated.
- (g) Update remarks as appropriate (maximum 150 characters). These remarks, if saved, will appear on the Conceptual Schema Report and the Pascal Include File.

Add Attribute

When selecting command 3, Add an Attribute, from the UPDATE ATTRIBUTE MENU, the screen illustrated in Figure 4-31 is displayed.

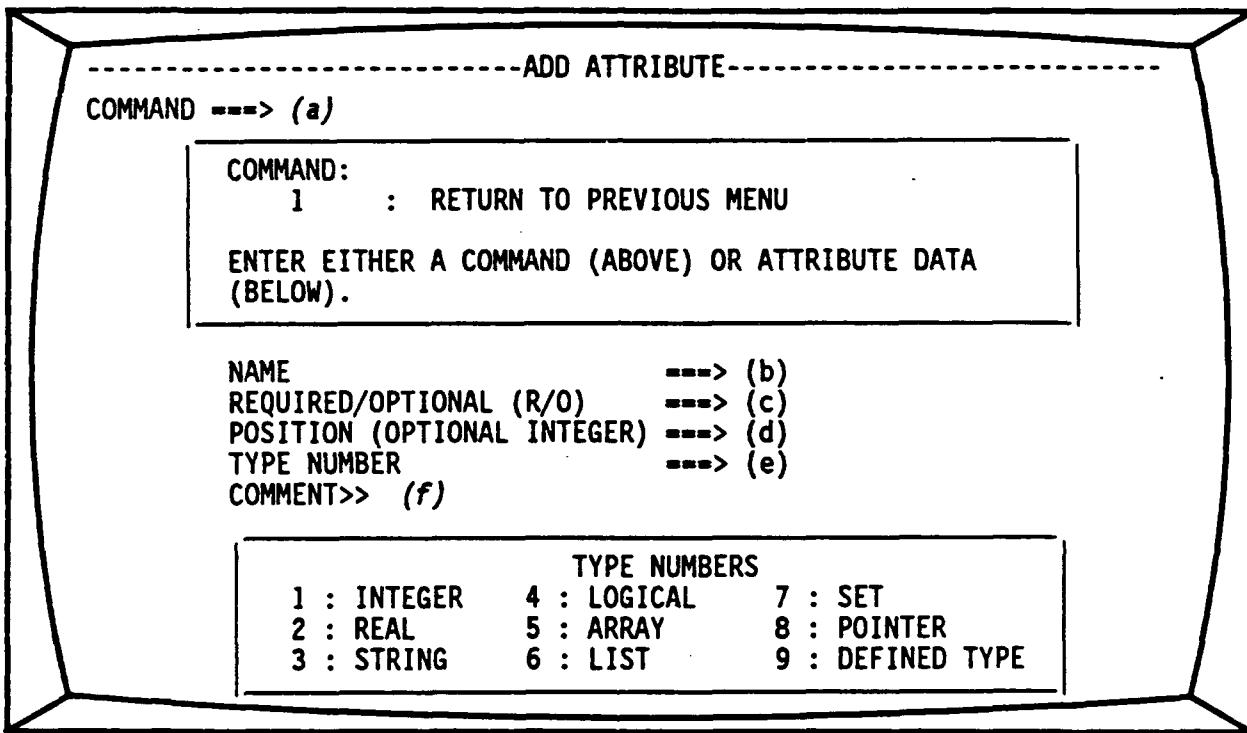


Figure 4-31 Add Attribute

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
- (b) Enter the name of an attribute to be added to the entity.
- (c) Enter "R" (required) or "O" (optional).
- (d) Enter the user specified physical position number of the attribute in the ADB. (This entry is optional.)
- (e) Enter the attribute type number (1-9). Possible create menus to be displayed include:

CREATE INTEGER	CREATE ARRAY	CREATE POINTER
CREATE REAL	CREATE LIST	CREATE DEFINED TYPE
CREATE STRING	CREATE SET	
- (f) Enter remarks as appropriate (maximum 50 characters). The date entered in this field will be saved and will appear on the Conceptual Schema Report and the Pascal Include File. After the attribute data is accepted, the appropriate create type menu is displayed.

Update Approval

The screen illustrated in Figure 4-33 displays the Update Approval options.

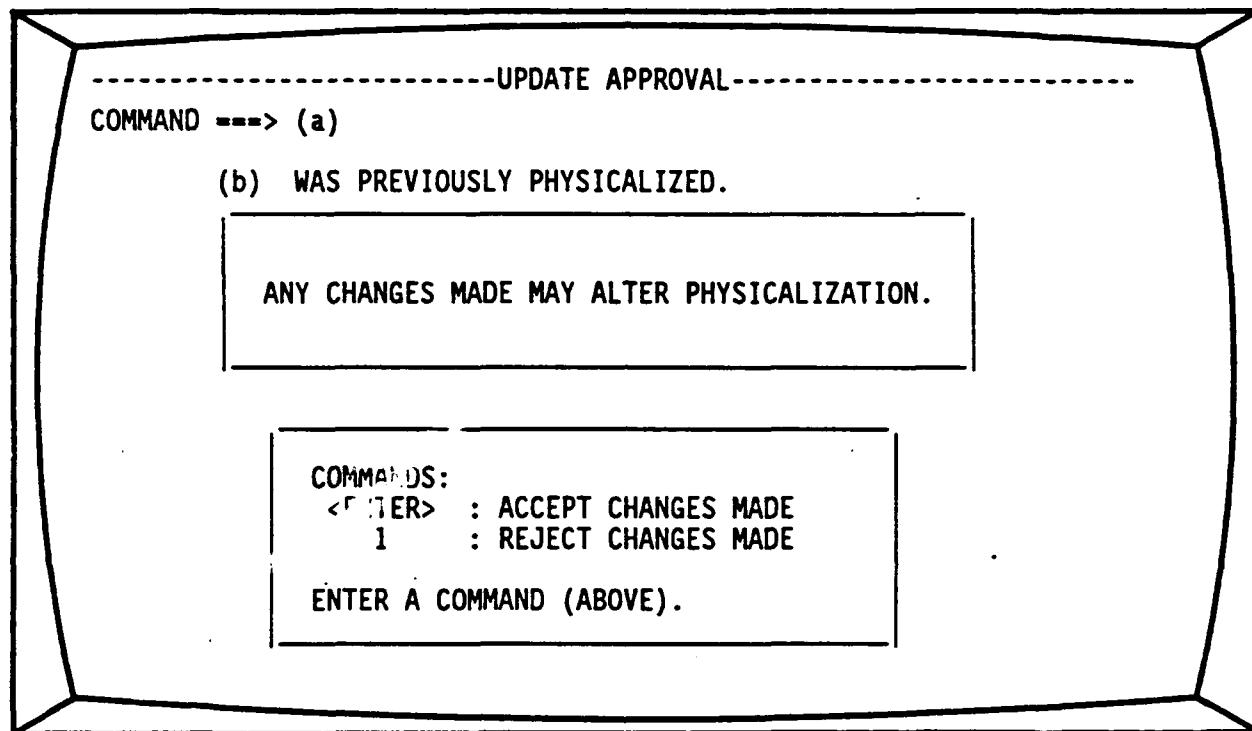


Figure 4-33 Update Approval

Menu Description:

- (a) Select option <ENTER> to accept the changes made.
Select option 1 to reject the changes made.
- (b) Specifies what has been previously physicalized.

Note: This menu is displayed after a change has been made to the model that would alter physicalization previously performed.

Menu Description (Continued):

Select option 5 to display the appropriate review type menu.
Possible review menus to be displayed include:

REVIEW INTEGER MENU REVIEW ARRAY MENU REVIEW POINTER MENU
REVIEW REAL MENU REVIEW LIST MENU REVIEW DEFINED TYPE MENU
REVIEW STRING MENU REVIEW SET MENU

- (b) The current array type is displayed.
- (c) The current array lower bound is displayed.
- (d) The array lower bound may be updated.
- (e) The current array upper bound is displayed.
- (f) The array upper bound may be updated.
- (g) The current array type is displayed.
- (h) The array type may be changed (1-9). If a new array type is entered, the appropriate create type menu is displayed. Possible create menus to be displayed include:

CREATE INTEGER MENU CREATE ARRAY MENU CREATE POINTER MENU
CREATE REAL MENU CREATE LIST MENU CREATE DEFINED TYPE MENU
CREATE STRING MENU CREATE SET MENU

Update Attribute Menu

The Update Attribute Menu can be displayed through various update functions. One method of accessing the Update Attribute Menu is to select command 4, Update Local Attributes, from the UPDATE MENU. The menu illustrated in Figure 4-35 illustrates the Update Attribute Menu.

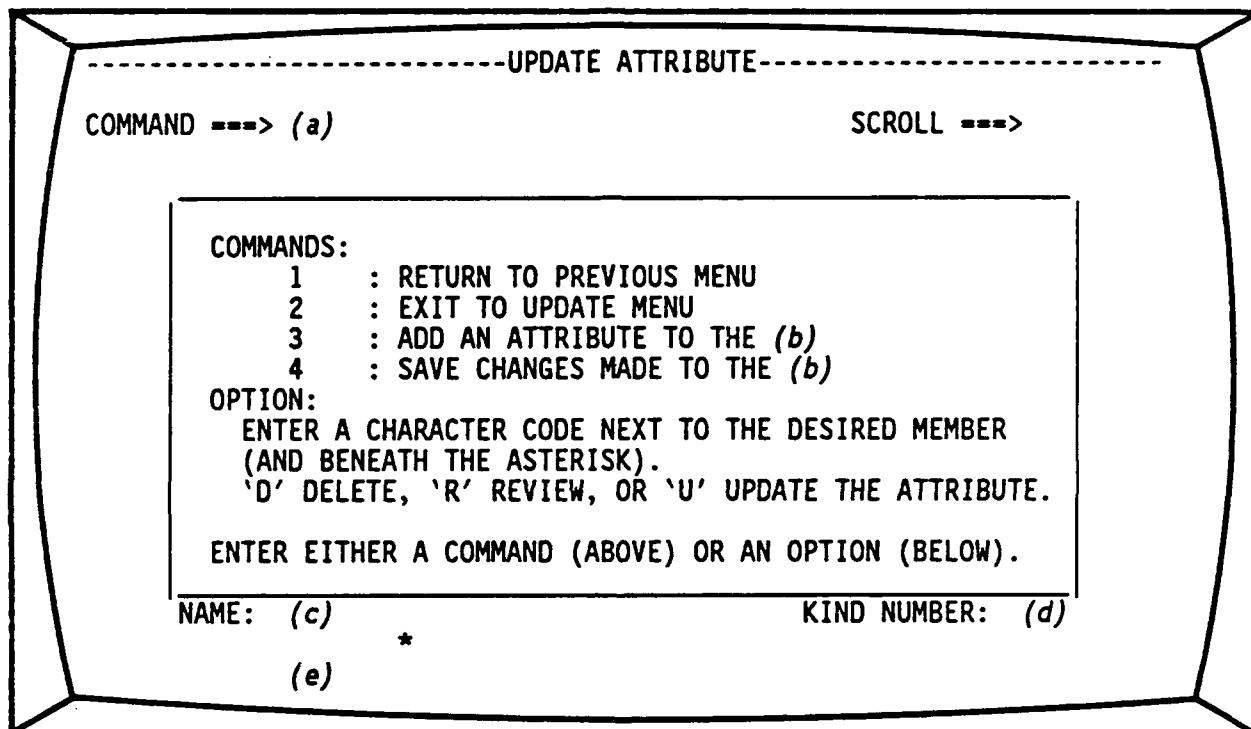


Figure 4-35 Update Attribute

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the UPDATE MENU.
Select option 3 to add an attribute to the entity. The ADD ATTRIBUTE MENU is displayed.
Select option 4 to accept any changes made to the entity. The DISPLAY LIST MENU will be redisplayed listing the modeled entities.
- (b) ENTITY or SUPERTYPE as appropriate.
- (c) The entity or supertype name.
- (d) The entity kind number.
- (e) The entity attributes are displayed.
Enter 'D' next to an attribute that is to be deleted from the model.
Enter 'R' next to an attribute that is to be reviewed. The REVIEW ATTRIBUTE MENU is displayed.
Enter 'U' next to an attribute that is to be updated. The UPDATE ATTRIBUTE DATA MENU is displayed.

Update Attribute Data

When the character code "U" is entered next to the desired member from the UPDATE ATTRIBUTE MENU, the screen illustrated in Figure 4-36 is displayed.

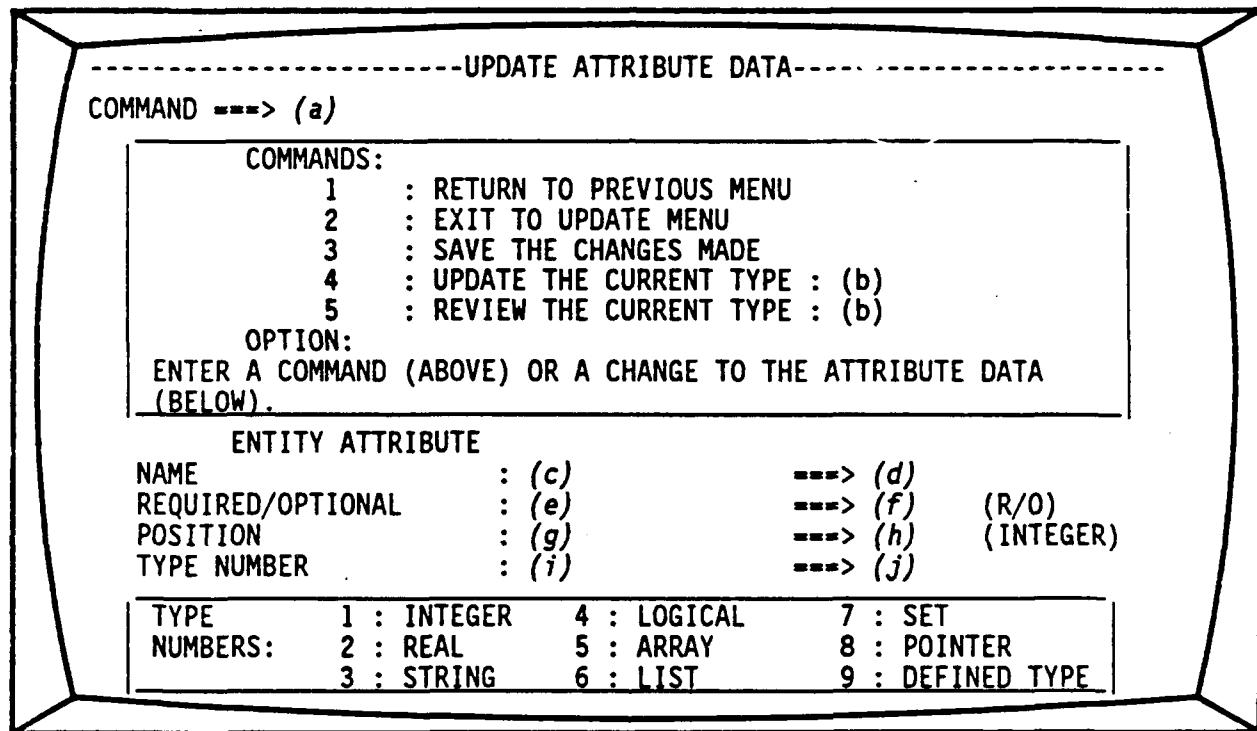


Figure 4-36 Update Attribute Date

Menu Description:

(a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the UPDATE MENU.
Select option 3 to accept any changes made to the attribute.
Select option 4 to display the appropriate update type menu.
Possible update menus to be displayed include:
 UPDATE INTEGER UPDATE ARRAY UPDATE POINTER
 UPDATE REAL UPDATE LIST UPDATE DEFINED TYPE
 UPDATE STRING UPDATE SET
Select option 5 to display the appropriate review type menu.
Possible review menus to be displayed include:
 REVIEW INTEGER REVIEW ARRAY REVIEW POINTER
 REVIEW REAL REVIEW LIST REVIEW DEFINED TYPE
 REVIEW STRING REVIEW SET

(b) The current attribute type is displayed.
(c) The current attribute name is displayed.
(d) The attribute name may be updated.

UM560130002
22 December 1987

Menu Description (Continued):

- (e) The current required/optional characteristic of the attribute is displayed.
- (f) The required/optional characteristic of the attribute may be updated.
- (g) The current user specified physical position of the attribute in the ADB is displayed.
- (h) The user specified physical position of the attribute in the ADB may be updated.
- (i) The current attribute type is displayed.
- (j) The attribute type may be updated (1-9). If a new attribute type is entered, the appropriate create type menu is displayed. Possible create menus to be displayed include:
CREATE INTEGER MENU CREATE ARRAY MENU CREATE POINTER MENU
CREATE REAL MENU CREATE LIST MENU CREATE DEFINED TYPE MENU
CREATE STRING MENU CREATE SET MENU

Update Class Members

When selecting command 4, Update/Review/Add/Delete Members, from the UPDATE CLASS MENU, the screen illustrated in Figure 4-37 is displayed.

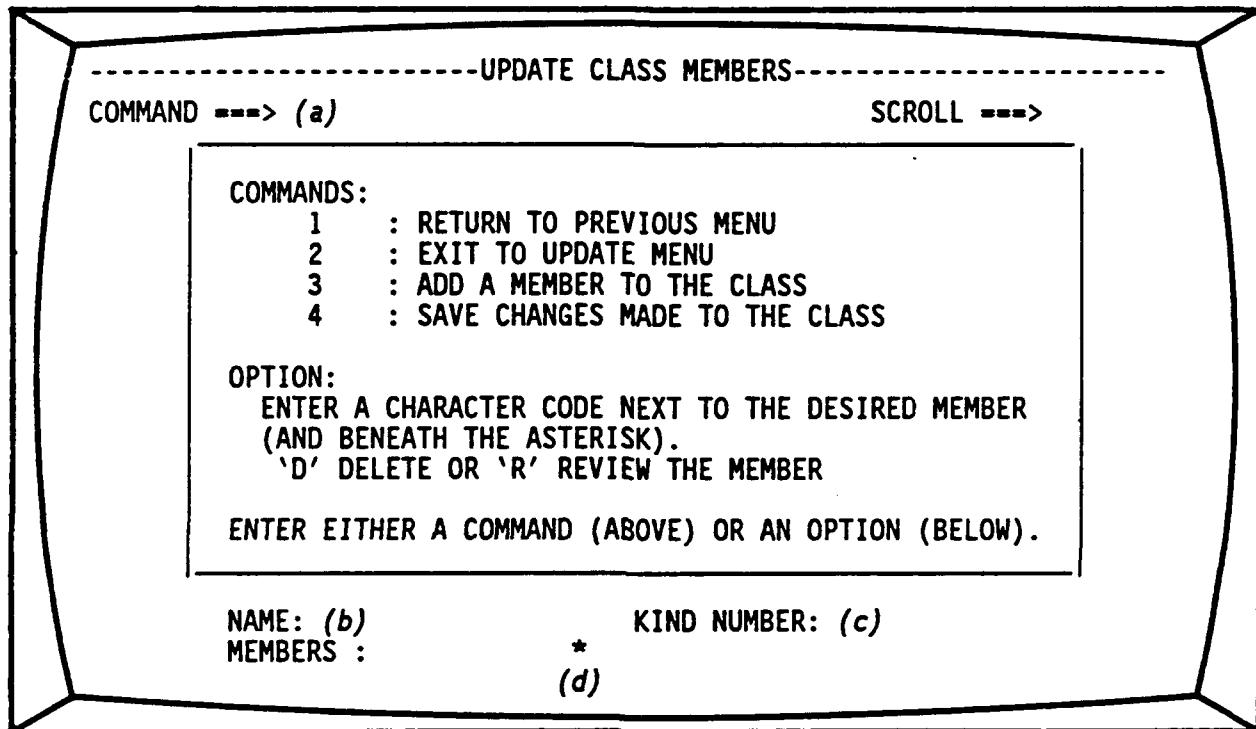


Figure 4-37 Update Class

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the UPDATE MENU.
Select option 3 to add a member to the class. The DISPLAY LIST MENU is displayed listing the eligible entities and classes.
Select option 4 to accept any changes made to the class. The DISPLAY LIST MENU is redisplayed listing the modeled classes.
- (b) The current class name is displayed.
- (c) The current class kind number is displayed.
- (d) The class members are displayed.
Enter 'D' next to a member that is to be deleted from the model.
Enter 'R' next to a member that is to be reviewed. The REVIEW ENTITY or REVIEW CLASS MENU is displayed.

Update Enumeration

The screen illustrated in Figure 4-38 displays the Update Enumeration option.

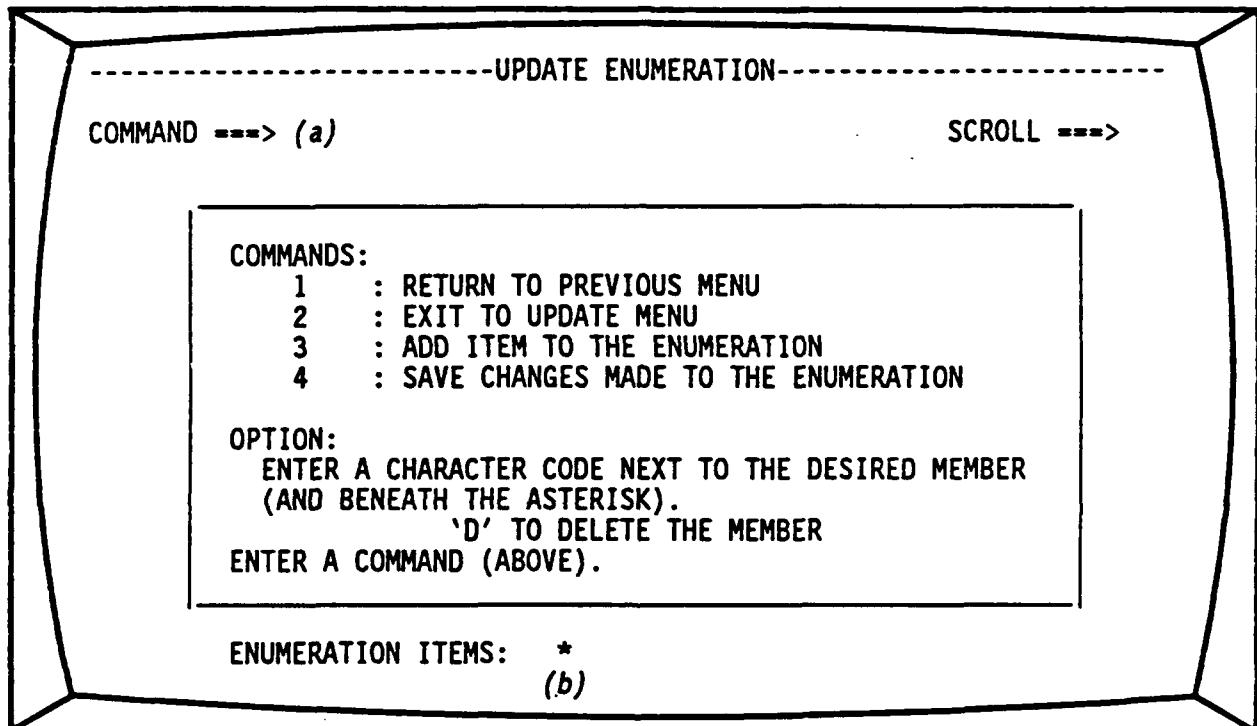


Figure 4-38 Update Enumeration

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the UPDATE MENU.
Select option 3 to add an enumeration item to the enumeration. The ADD ENUMERATION ITEM MENU will be displayed.
Select option 4 to accept any changes made to the enumeration.
- (b) The enumeration items are displayed.
Enter 'D' next to an item that is to be deleted from the model.

Update Integer

The screen illustrated in Figure 4-39 displays the Update Integer option.

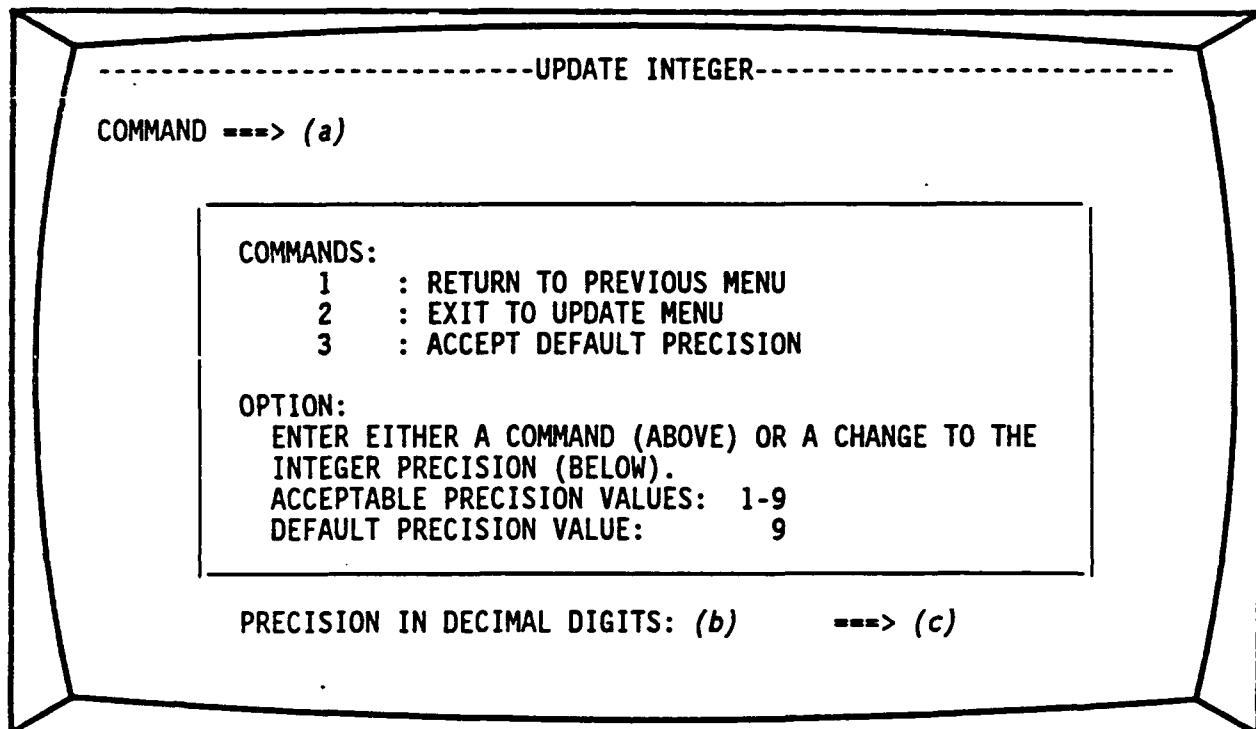


Figure 4-39 Update Integer

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the UPDATE MENU.
Select option 3 to accept the default precision.
- (b) The current integer precision in decimal digits is displayed.
- (c) The integer precision may be updated.

Update List

The screen illustrated in Figure 4-40 displays the Update List option.

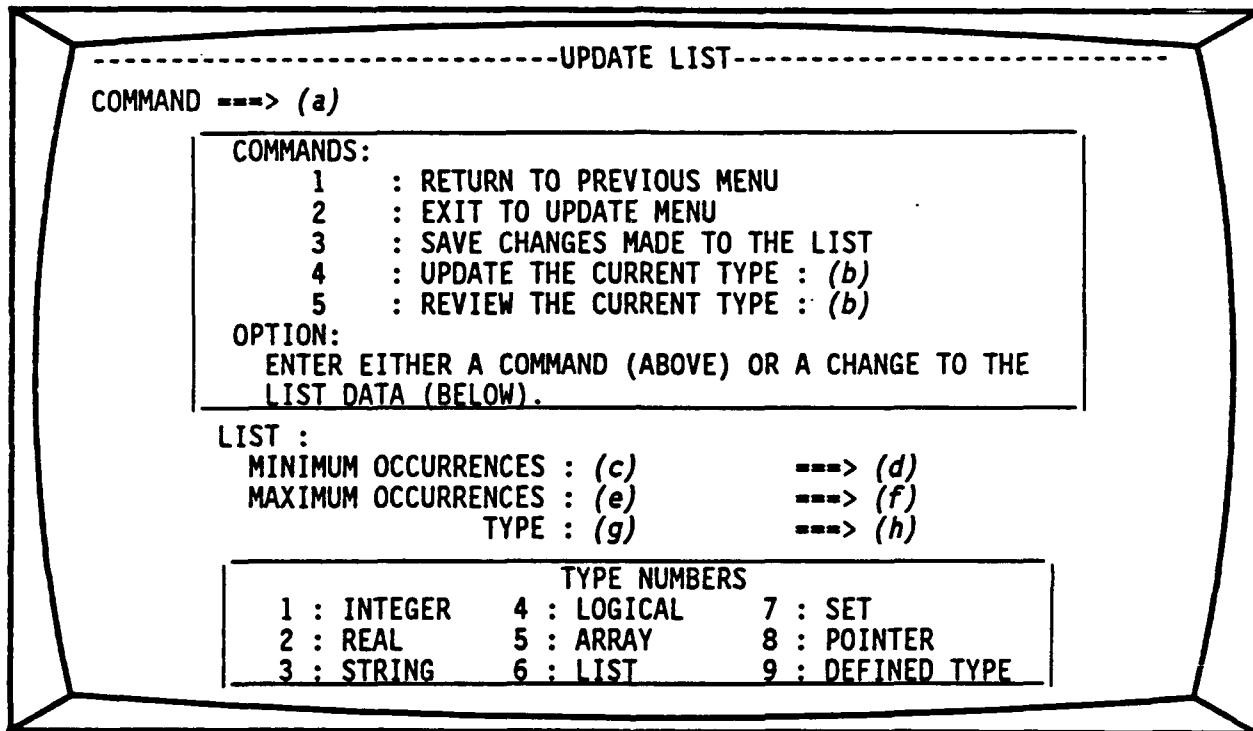


Figure 4-40 Update List

Menu Description:

(a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the UPDATE MENU.
Select option 3 to accept the changes made to the list.
Select option 4 to display the appropriate update type menu.
Possible update menus to be displayed include:
 UPDATE INTEGER MENU UPDATE ARRAY MENU UPDATE POINTER MENU
 UPDATE REAL MENU UPDATE LIST MENU UPDATE DEFINED TYPE MENU
 UPDATE STRING MENU UPDATE SET MENU
Select option 5 to display the appropriate review type menu.
Possible review menus to be displayed include:
 REVIEW INTEGER MENU REVIEW ARRAY MENU REVIEW POINTER MENU
 REVIEW REAL MENU REVIEW LIST MENU REVIEW DEFINED TYPE MENU
 REVIEW STRING MENU REVIEW SET MENU

Menu Description (Continued):

- (b) The current list type is displayed.
- (c) The current list minimum occurrences is displayed.
- (d) The list minimum occurrences may be updated.
- (e) The current list maximum occurrences is displayed.
- (f) The list maximum occurrences may be updated.
- (g) The current list type is displayed.
- (h) The list type may be changed (1-9). If a new list type is entered, the appropriate create type menu is displayed. Possible create menus to be displayed include:
CREATE INTEGER MENU CREATE ARRAY MENU CREATE POINTER MENU
CREATE REAL MENU CREATE LIST MENU CREATE DEFINED TYPE MENU
CREATE STRING MENU CREATE SET MENU

Update Pointer

The screen illustrated in Figure 4-41 displays the Update Pointer option.

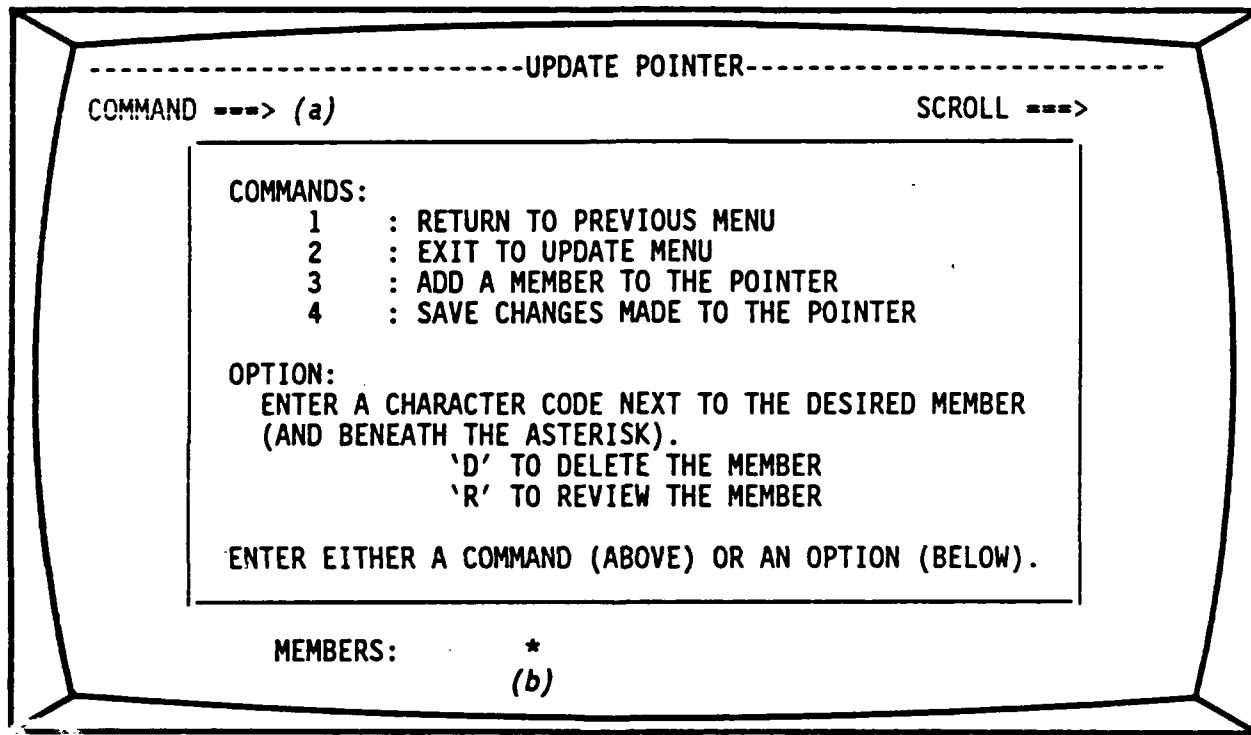


Figure 4-41 Update Pointer

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the UPDATE MENU.
Select option 3 to add a reference to an entity or class. The DISPLAY LIST MENU is displayed listing the eligible entities and classes.
Select option 4 to accept any changes made to the pointer.
- (b) The entities and classes referenced by the pointer are displayed.
Enter 'D' next to a member that is to be deleted from the model.
Enter 'R' next to a member that is to be reviewed. The REVIEW ENTITY or REVIEW CLASS MENU is displayed.

Update Real

The screen illustrated in Figure 4-42 displays the Update Real option.

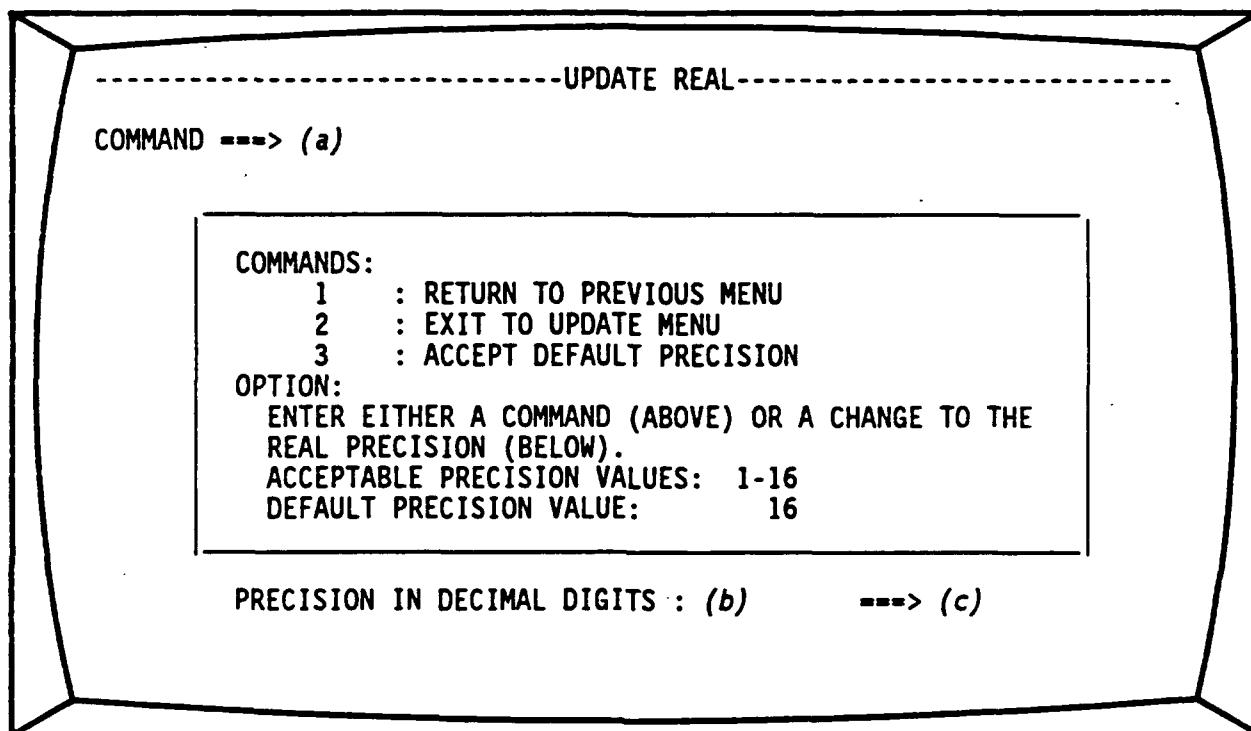


Figure 4-42 Update Real

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the UPDATE MENU.
Select option 3 to accept the default precision.
- (b) The current real precision in decimal digits is displayed.
- (c) The real precision may be updated.

Update Set

The screen illustrated in Figure 4-43 displays the Update Set option.

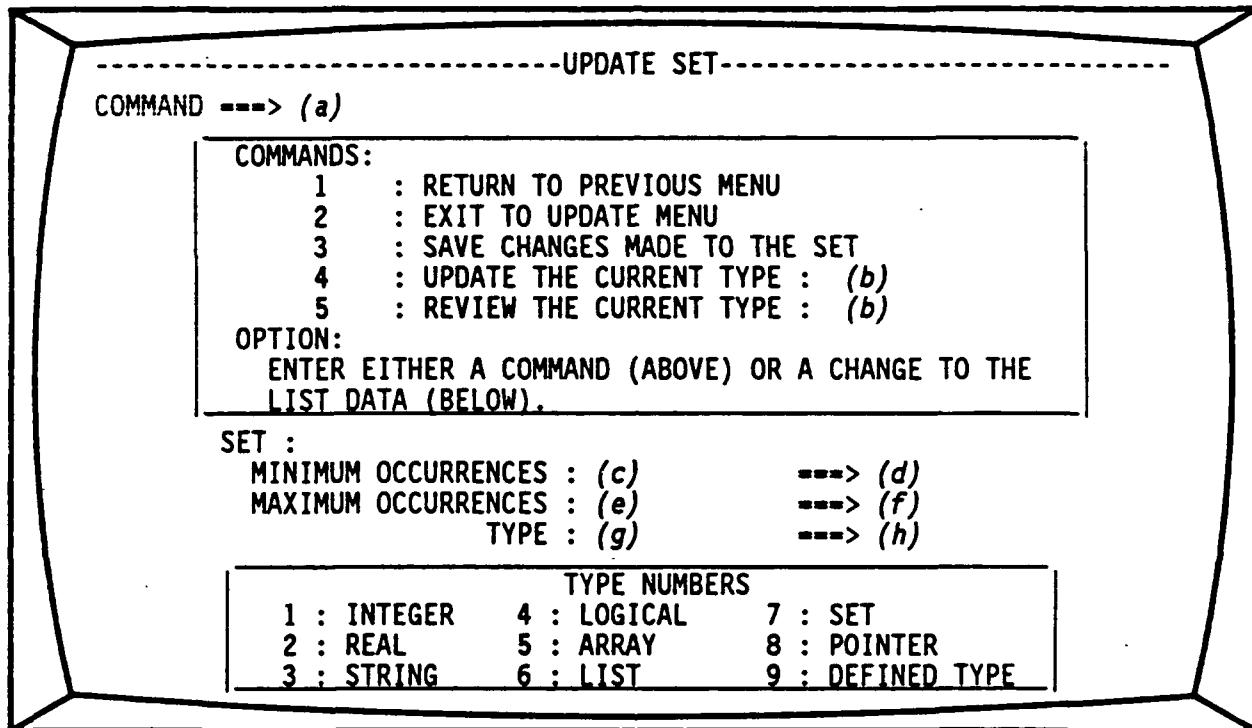


Figure 4-43 Update Set

Menu Description:

(a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the UPDATE MENU.
Select option 3 to accept the changes made to the set.
Select option 4 to display the appropriate update type menu.
Possible update menus to be displayed include:

UPDATE INTEGER MENU	UPDATE ARRAY MENU	UPDATE POINTER MENU
UPDATE REAL MENU	UPDATE LIST MENU	UPDATE DEFINED TYPE MENU
UPDATE STRING MENU	UPDATE SET MENU	

Menu Description (Continued):

Select option 5 to display the appropriate review type menu. Possible review menus to be displayed include:

REVIEW INTEGER MENU	REVIEW ARRAY MENU	REVIEW POINTER MENU
REVIEW REAL MENU	REVIEW LIST MENU	REVIEW DEFINED TYPE MENU
REVIEW STRING MENU	REVIEW SET MENU	

- (b) The current set type is displayed.
- (c) The current set minimum occurrences is displayed.
- (d) The set minimum occurrences may be updated.
- (e) The current set maximum occurrences is displayed.
- (f) The set maximum occurrences may be updated.
- (g) The current set type is displayed.
- (h) The set type may be changed (1-9). If a new set type is entered, the appropriate create type menu is displayed. Possible create menus to be displayed include:

CREATE INTEGER MENU	CREATE ARRAY MENU	CREATE POINTER MENU
CREATE REAL MENU	CREATE LIST MENU	CREATE DEFINED TYPE MENU
CREATE STRING MENU	CREATE SET MENU	

Update String

The screen illustrated in Figure 4-44 displays the Update String option.

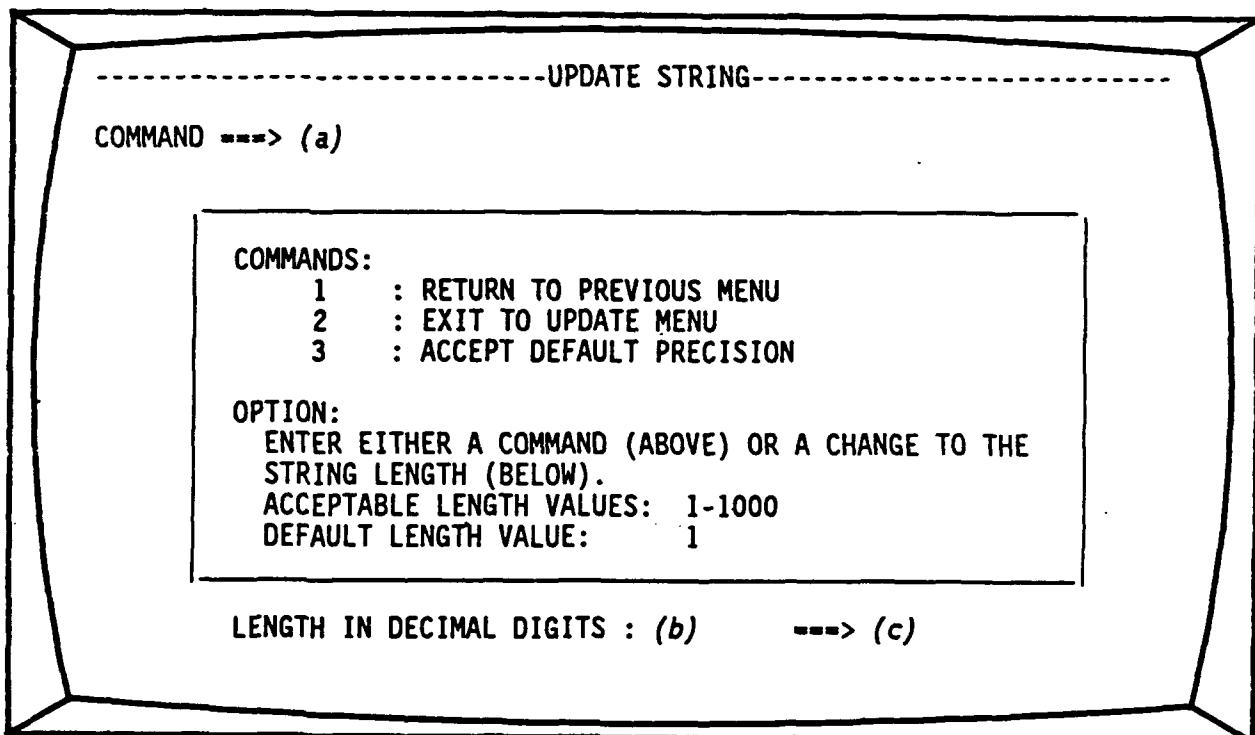


Figure 4-44 Update String

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the UPDATE MENU.
Select option 3 to accept default precision.
- (b) The current string length in decimal digits is displayed.
- (c) The string length may be updated.

Update Subschema Members

The screen illustrated in Figure 4-45 displays the Update Subschema Members option.

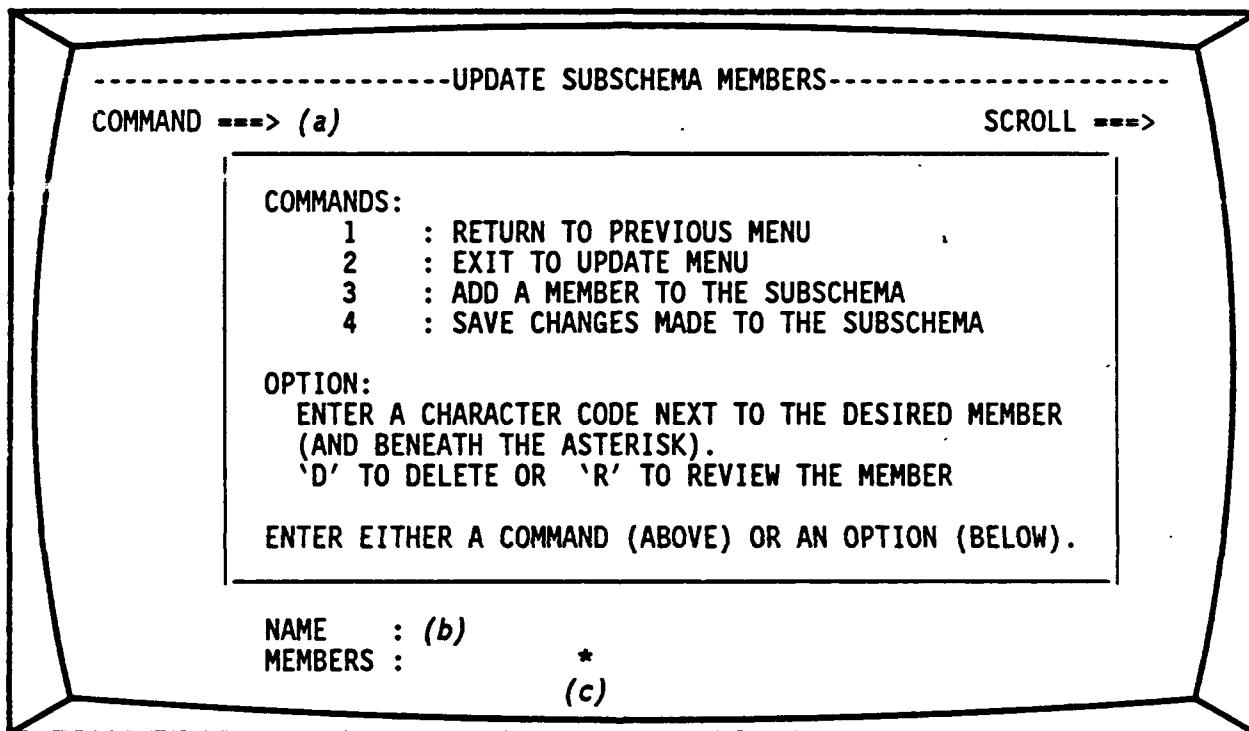


Figure 4-45 Update Subschema Members

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the UPDATE MENU.
Select option 3 to add an entity or class to the subschema. The DISPLAY LIST MENU is displayed listing the eligible entities and classes.
Select option 4 to accept any changes made to the subschema. The DISPLAY LIST MENU will be redisplayed listing the modeled subschemas.
- (b) The subschema name will be displayed.
(c) The entity and class members of the subschema will be displayed.
Enter 'D' next to a member that is to be deleted from the model.
Enter 'R' next to a member that is to be reviewed. The REVIEW ENTITY or REVIEW CLASS MENU is displayed.

4.5 REVIEW MENU

The REVIEW function within the Schema Manager software includes the main REVIEW MENU. There are six review functions residing on the main REVIEW MENU including:

- Review Entity
- Review Defined Type
- Review Supertype
- Review Global Attribute
- Review Subschema
- Review Class

The main REVIEW MENU is illustrated in Figure 4-46. Supporting menus used within review functions include (alphabetically):

- Display Attributes
- Display List
- Review Array
- Review Enumeration
- Review Integer
- Review List
- Review Pointer
- Review Real
- Review Set
- Review String

These supporting menus are described in this section. Some of the supporting menus are described and referenced in other sections.

When selecting command 5, Review from the MAIN MENU, the screen illustrated in Figure 4-46 is displayed.

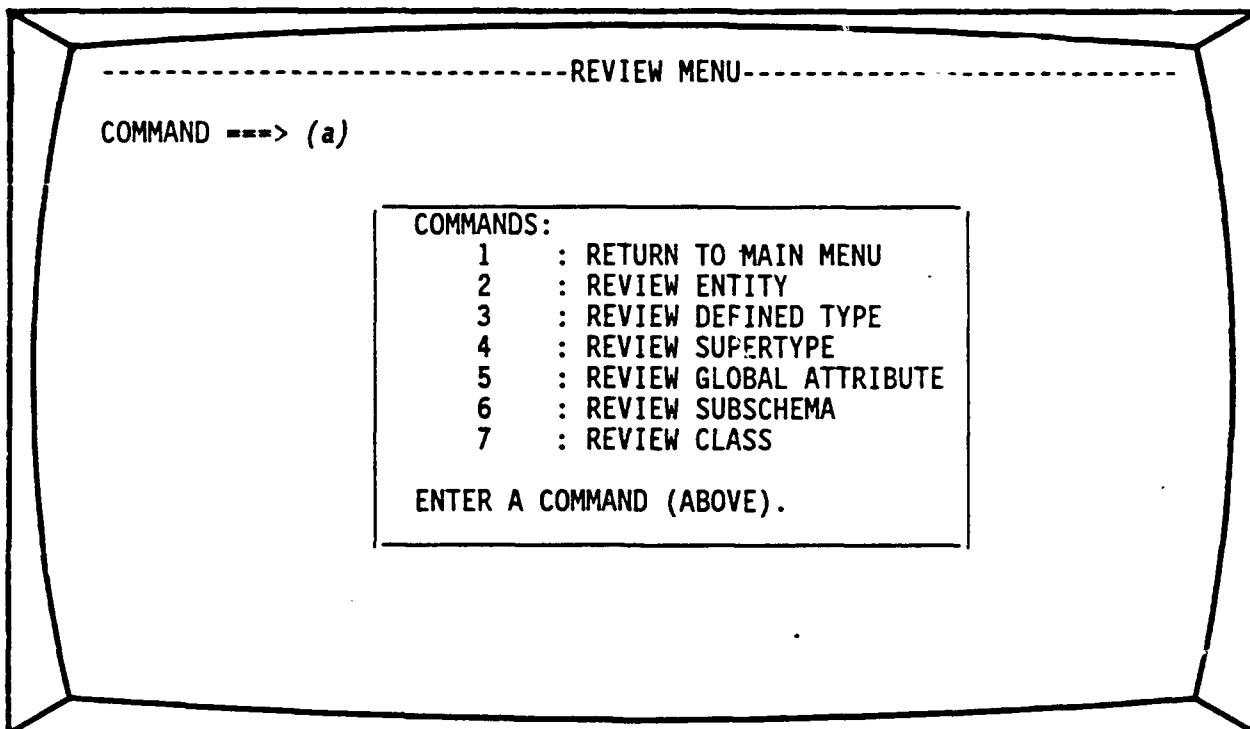


Figure 4-46 Review Menu

Menu Description:

- (a) Select option 1 to redisplay the MAIN MENU.
Select option 2 to display the DISPLAY LIST MENU listing the modeled entities.
Select option 3 to display the DISPLAY LIST MENU listing the modeled defined types.
Select option 4 to display the DISPLAY LIST MENU listing the modeled supertypes.
Select option 5 to display the DISPLAY LSIT MENU listing the modeled global attributes.
Select option 6 to display the DISPLAY LIST MENU listing the modeled subschemas.
Select option 7 to display the DISPLAY LIST MENU listing the modeled classes.

4.5.1 REVIEW ENTITY

The Review Entity screen can be displayed through various review functions. One method of accessing this function is to select command 2, Review Entity Menu from the REVIEW MENU. The Review Entity screen is illustrated in Figure 4-47.

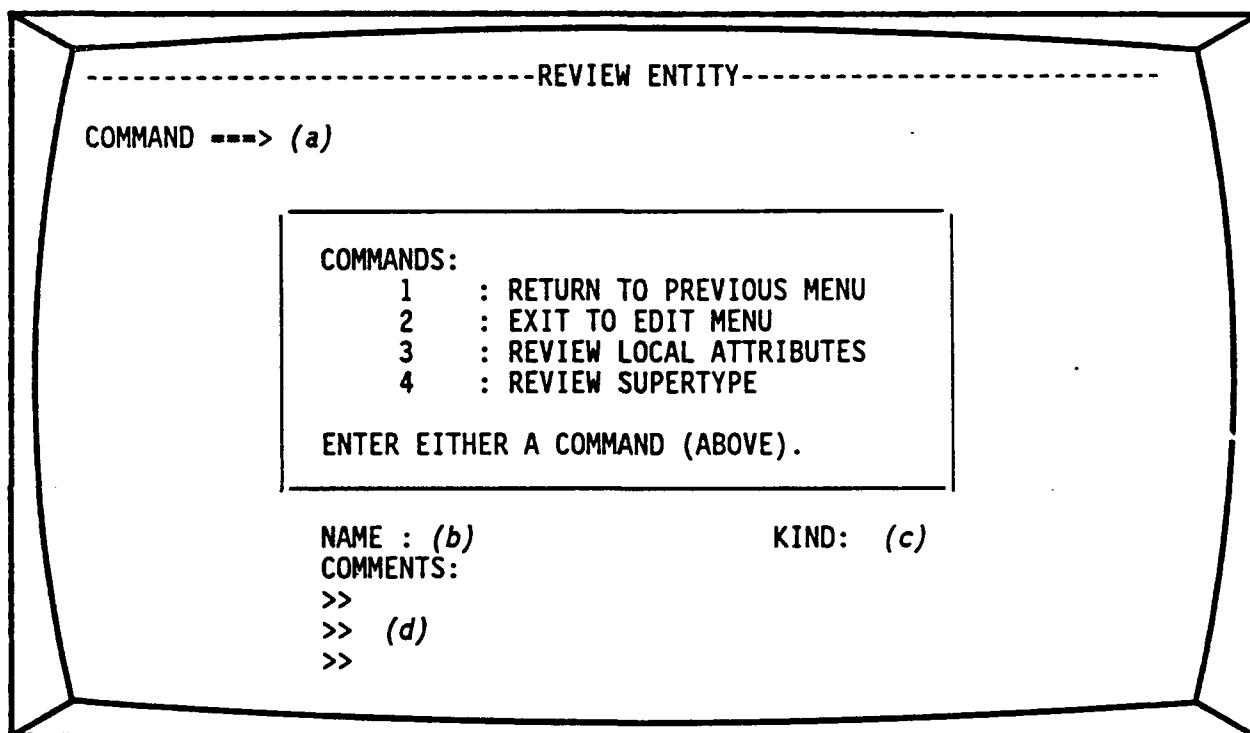


Figure 4-47 Review Entity

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the appropriate edit menu.
Select option 3 to display the DISPLAY ATTRIBUTES MENU.
Select option 4 to display the REVIEW SUPERTYPE MENU.
- (b) The entity name will be displayed.
- (c) The entity kind number will be displayed.
- (d) The entity remarks will be displayed.

4.5.2 REVIEW DEFINED TYPE

The screen illustrated in Figure 4-48 displays the Review Defined Type option.

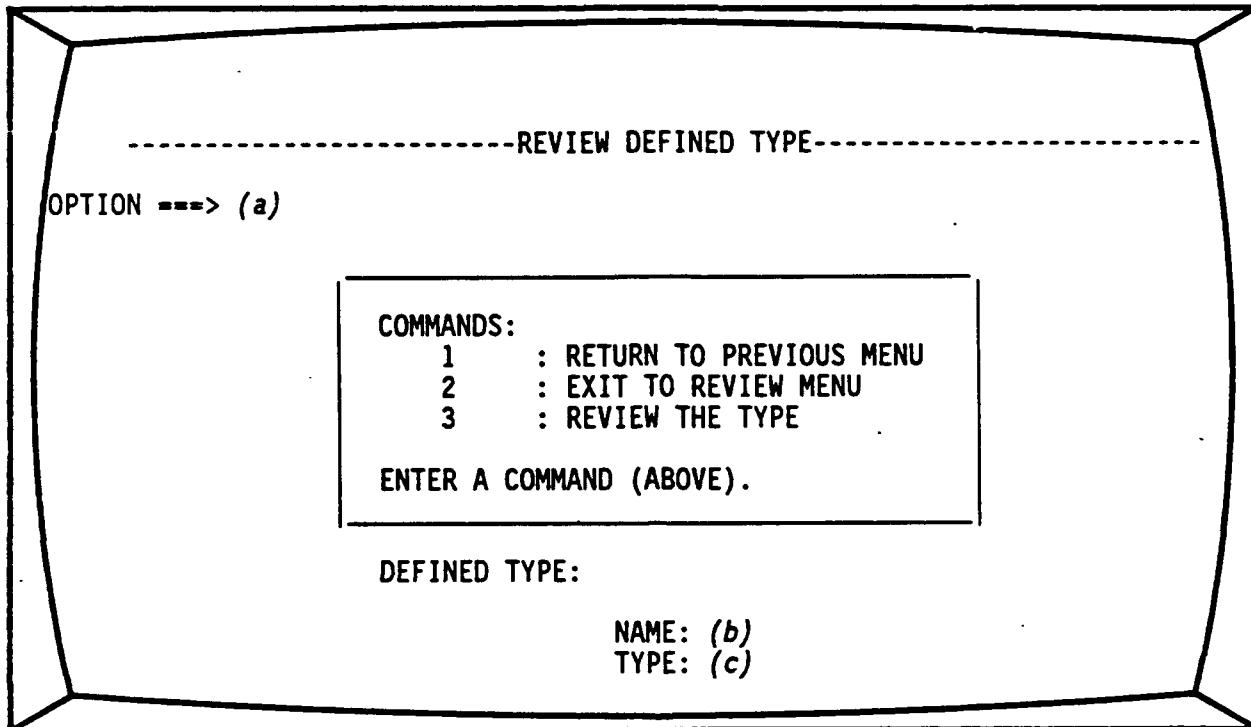


Figure 4-48 Review Defined Type

Menu Description

(a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the appropriate edit menu.
Select option 3 to display the appropriate review type menu.
Possible review menus to be displayed include:
REVIEW INTEGER MENU REVIEW ARRAY MENU REVIEW POINTER MENU
REVIEW REAL MENU REVIEW LIST MENU REVIEW DEFINED TYPE MENU
REVIEW STRING MENU REVIEW SET MENU REVIEW ENUMERATION MENU
(b) The defined type name is displayed.
(c) The defined type type is displayed.

4.5.3 REVIEW SUPERTYPE

The Review Supertype screen can be displayed through various review functions. One method of accessing this screen is to select command 3, Review Supertype Menu from the REVIEW MENU. The Review Supertype screen is illustrated in Figure 4-49.

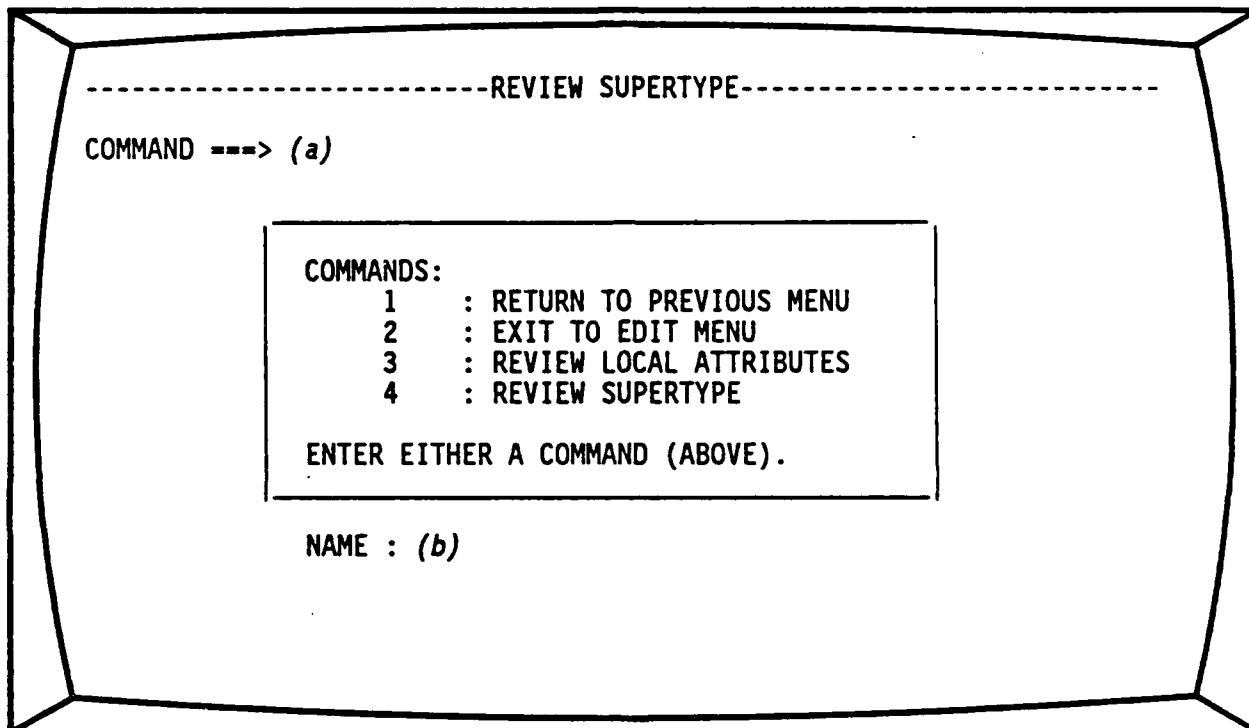


Figure 4-49 Review Supertype

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the appropriate edit menu.
Select option 3 to display the DISPLAY ATTRIBUTES MENU.
Select option 2 to display the REVIEW SUPERTYPE MENU.
- (b) The supertype name will be displayed.

4.5.4 REVIEW GLOBAL ATTRIBUTE

The Review Global Attribute screen can be displayed through various review functions. One method of accessing the review screen is to select command 4, **Review Global Attribute Menu** from the REVIEW MENU. This screen is illustrated in Figure 4-50.

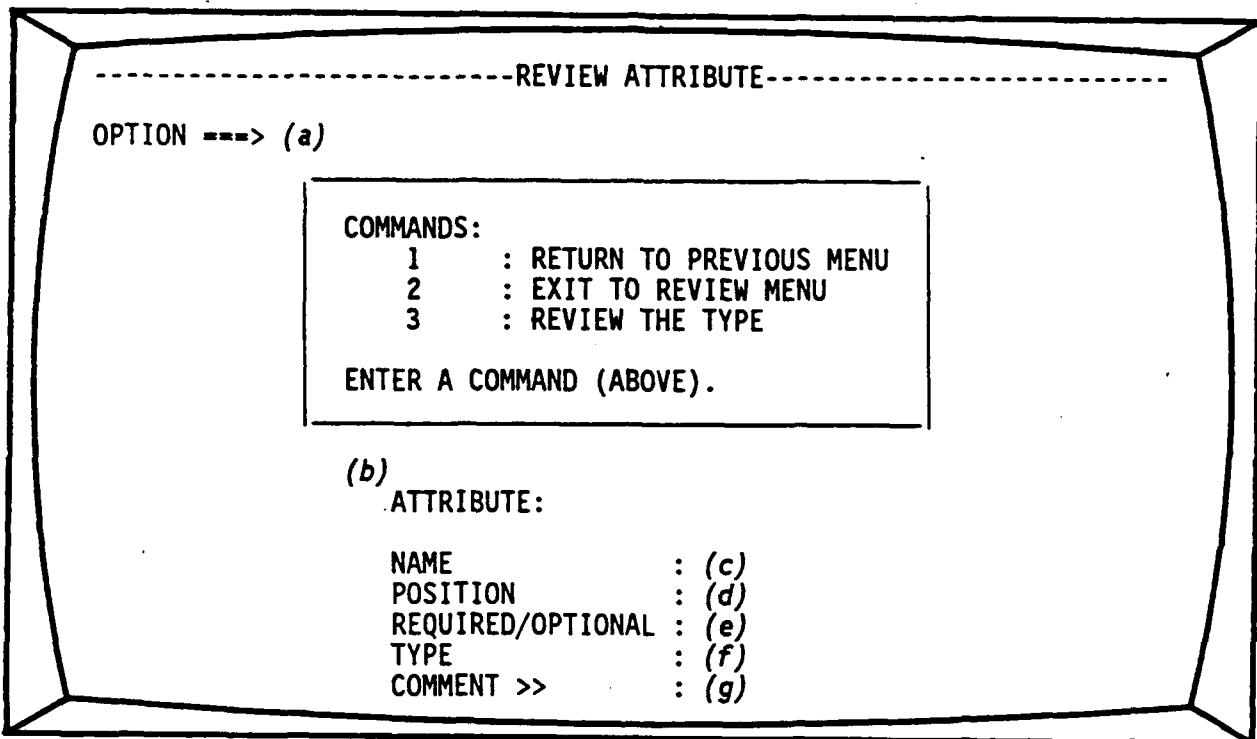


Figure 4-50 Review Attribute

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the appropriate edit menu.
Select option 3 to display the appropriate review type menu.
Possible review menus to be displayed include:
REVIEW INTEGER MENU REVIEW ARRAY MENU REVIEW POINTER MENU
REVIEW REAL MENU REVIEW LIST MENU REVIEW DEFINED TYPE MENU
REVIEW STRING MENU REVIEW SET MENU REVIEW ENUMERATION MENU
- (b) The "global" or "entity" keyword is displayed.
- (c) The attribute name will be displayed.
- (d) The user specified physical position number of the attribute in the ADB is displayed.
- (e) The attribute required/optional characteristic is displayed.
- (f) The attribute type is displayed.
- (g) The attribute remarks are displayed.

4.5.5 REVIEW SUBSCHEMA

When selecting command 5, Review Subschema Menu from the REVIEW MENU, the screen illustrated in Figure 4-51 is displayed.

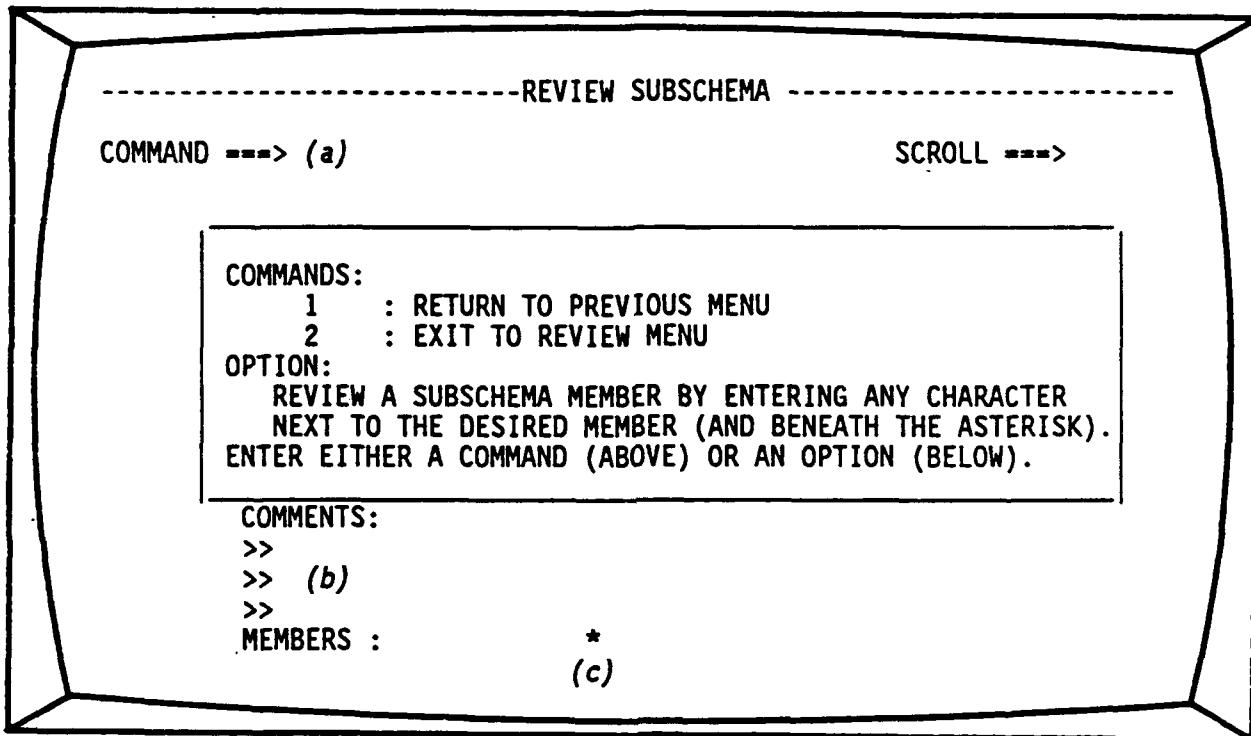


Figure 4-51 Review Subschema

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the review menu.
- (b) The subschema remarks are displayed.
- (c) A list of the modeled subschema members is displayed. A subschema member may be reviewed by entering any character next to the desired member's name. The REVIEW ENTITY or REVIEW CLASS MENU is displayed.

4.5.6 REVIEW CLASS

The Review Class screen can be displayed through various review functions. One method of accessing this screen is to select command 6, Review Class Menu from the REVIEW MENU. This screen is illustrated in Figure 4-52.

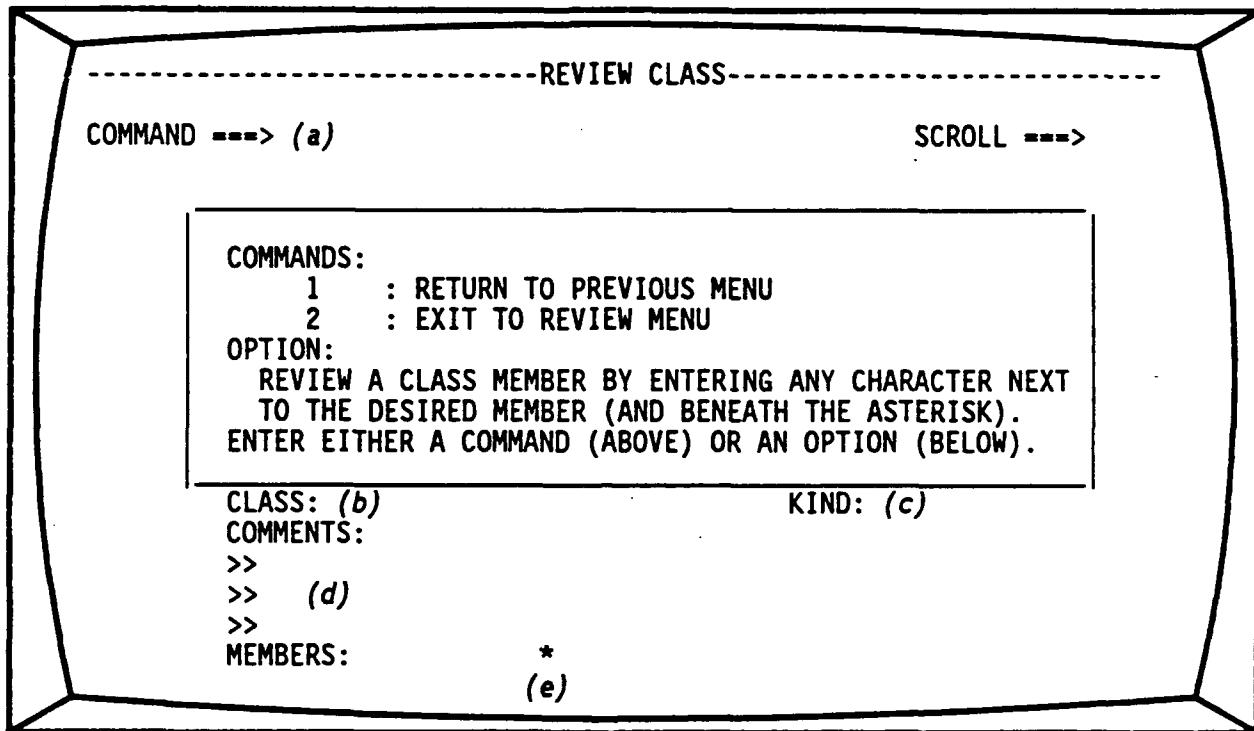


Figure 4-52 Review Class

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the appropriate edit menu.
- (b) The class name is displayed.
- (c) The class kind number is displayed.
- (d) The class remarks are displayed.
- (e) A list of the modeled class members is displayed. A class member may be reviewed by entering any character next to the desired member's name. The REVIEW ENTITY MENU or REVIEW CLASS MENU is displayed.

4.5.7 OTHER SUPPORTING MENUS

The supporting menus available within review functions include (alphabetically):

- Display Attributes
- Display List
- Review Array
- Review Enumeration
- Review Integer
- Review List
- Review Pointer
- Review Real
- Review Set
- Review String

These supporting menus are described in this section. Some of the supporting menus are described and referenced in other sections.

Display Attributes

The Display Attributes screen can be displayed through various functions. One method of accessing this screen is to select command 3, Review Local Attributes from the REVIEW ENTITY menu. This screen is illustrated in Figure 4-53.

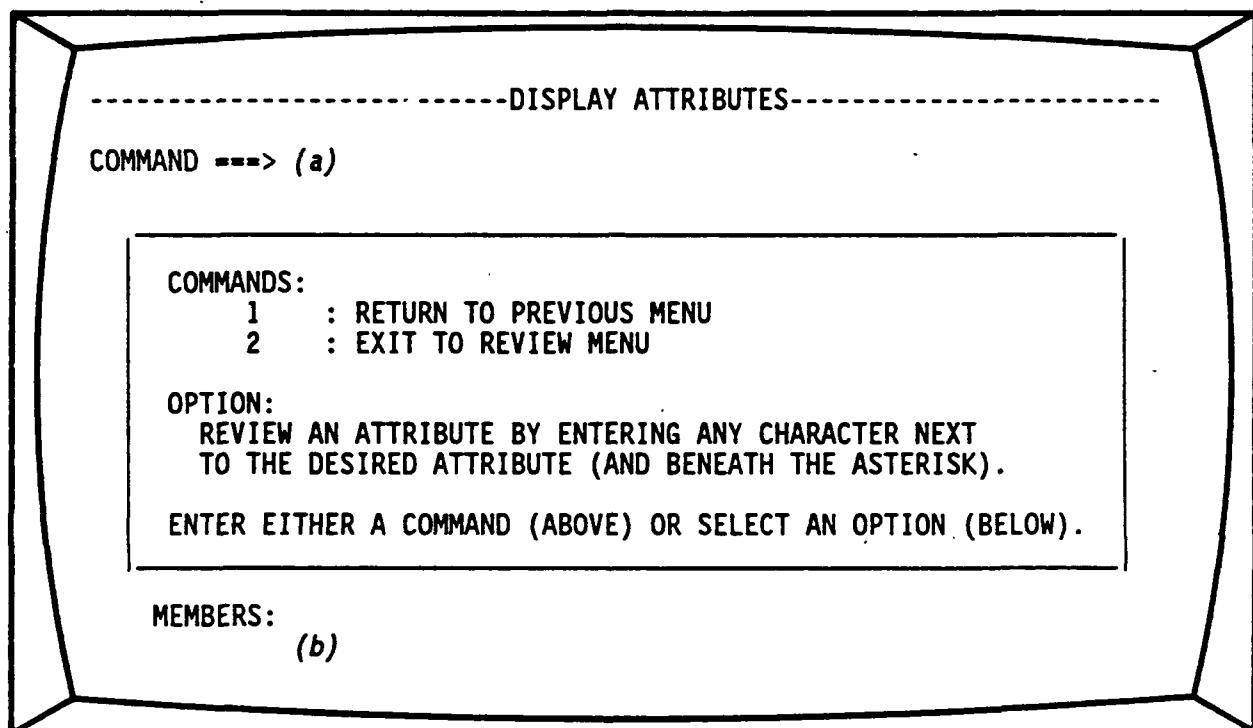


Figure 4-53 Display Attributes

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the appropriate edit menu.
- (b) A list of the attributes will be displayed.

Display List

The screen illustrated in Figure 4-54 displays the Display List option.

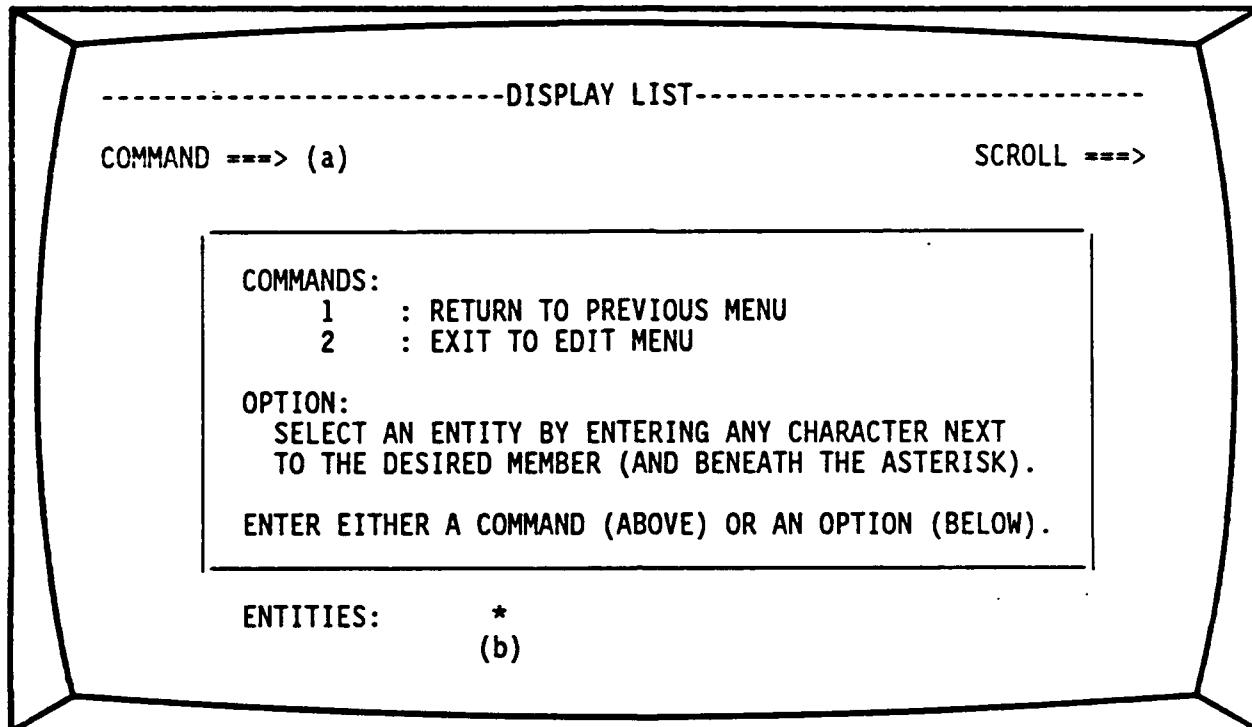


Figure 4-54 Display List

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the appropriate edit menu.
- (b) A list of "entities" is displayed. Select an "entity" by entering any character next to the desired "entity's" name.

Review Array

The screen illustrated in Figure 4-55 displays the Review Array option.

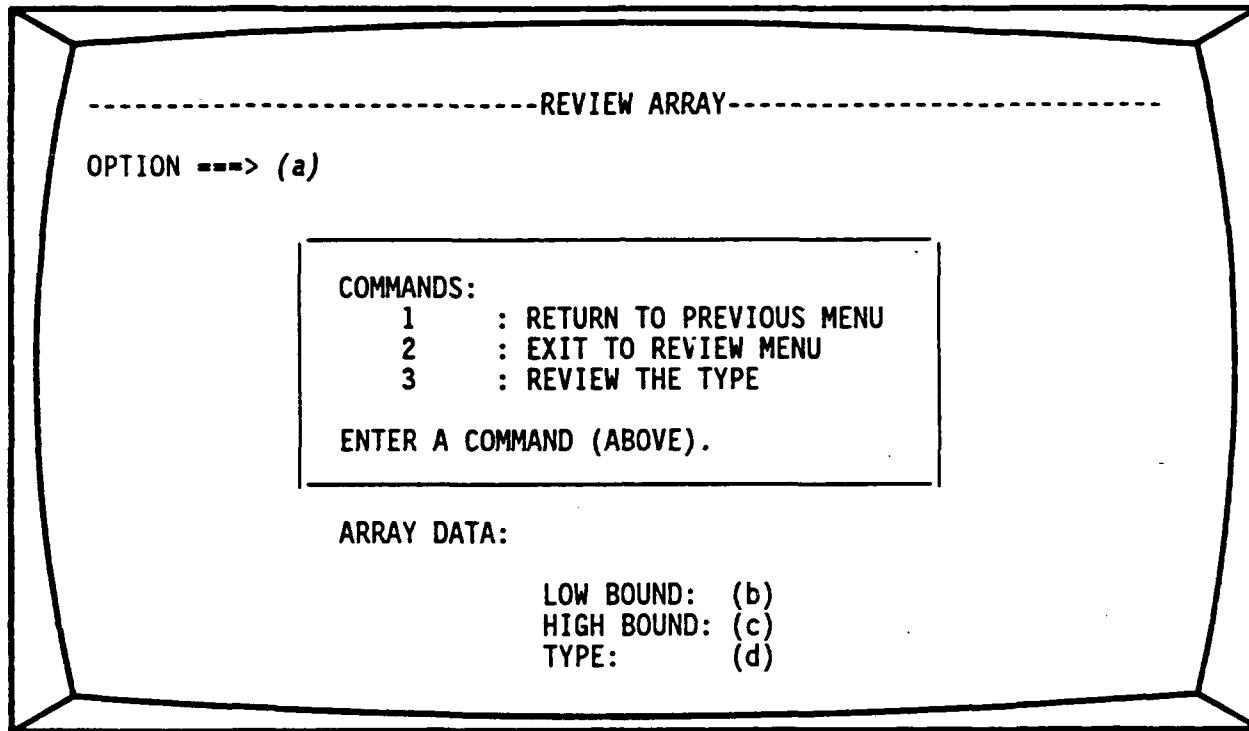


Figure 4-55 Review Array

Menu Description:

(a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the appropriate edit menu.
Select option 3 to display the appropriate review type menu.
Possible review menus to be displayed include:
REVIEW INTEGER MENU REVIEW LIST MENU REVIEW DEFINED TYPE MENU
REVIEW REAL MENU REVIEW SET MENU
REVIEW STRING MENU REVIEW POINTER MENU

(b) The array low bound is displayed.
(c) The array high bound is displayed.
(d) The array type is displayed.

Review Enumeration

The screen illustrated in Figure 4-56 displays the Review Enumeration option.

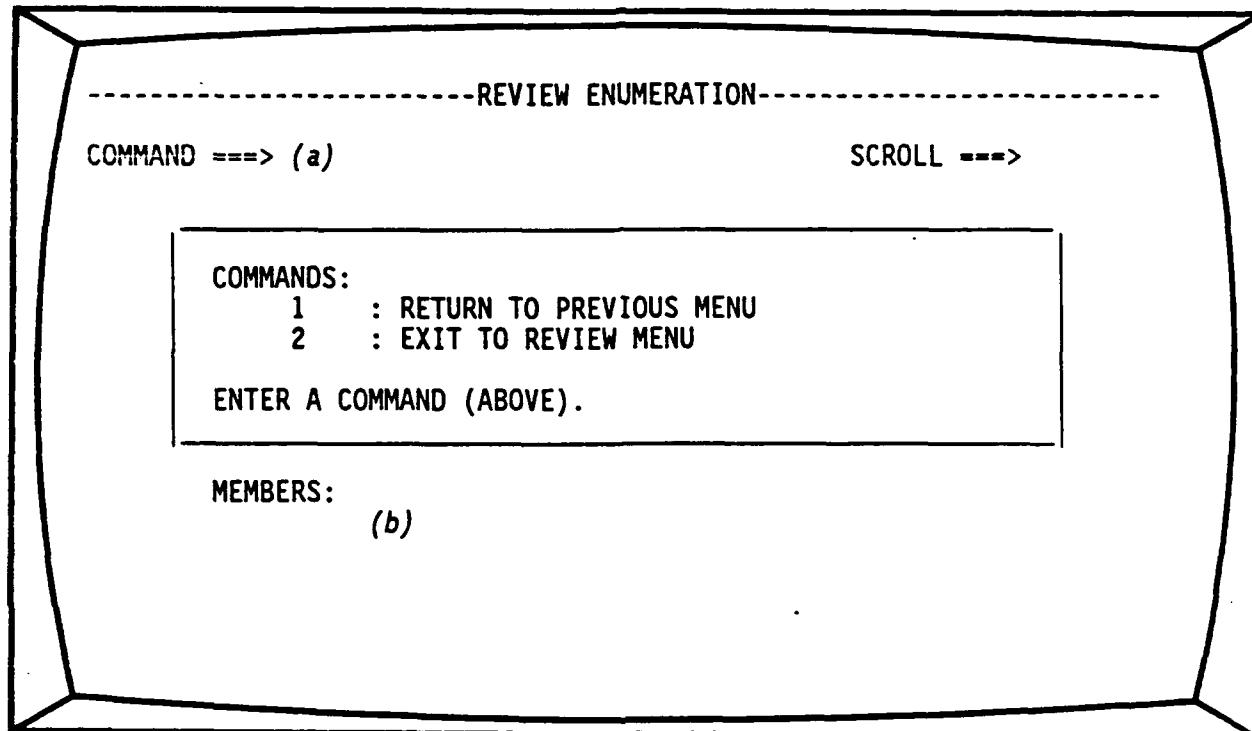


Figure 4-56 Review Enumeration

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the appropriate edit menu.
- (b) A list of the enumeration items is displayed.

Review Integer

The screen illustrated in Figure 4-57 displays the Review Integer option.

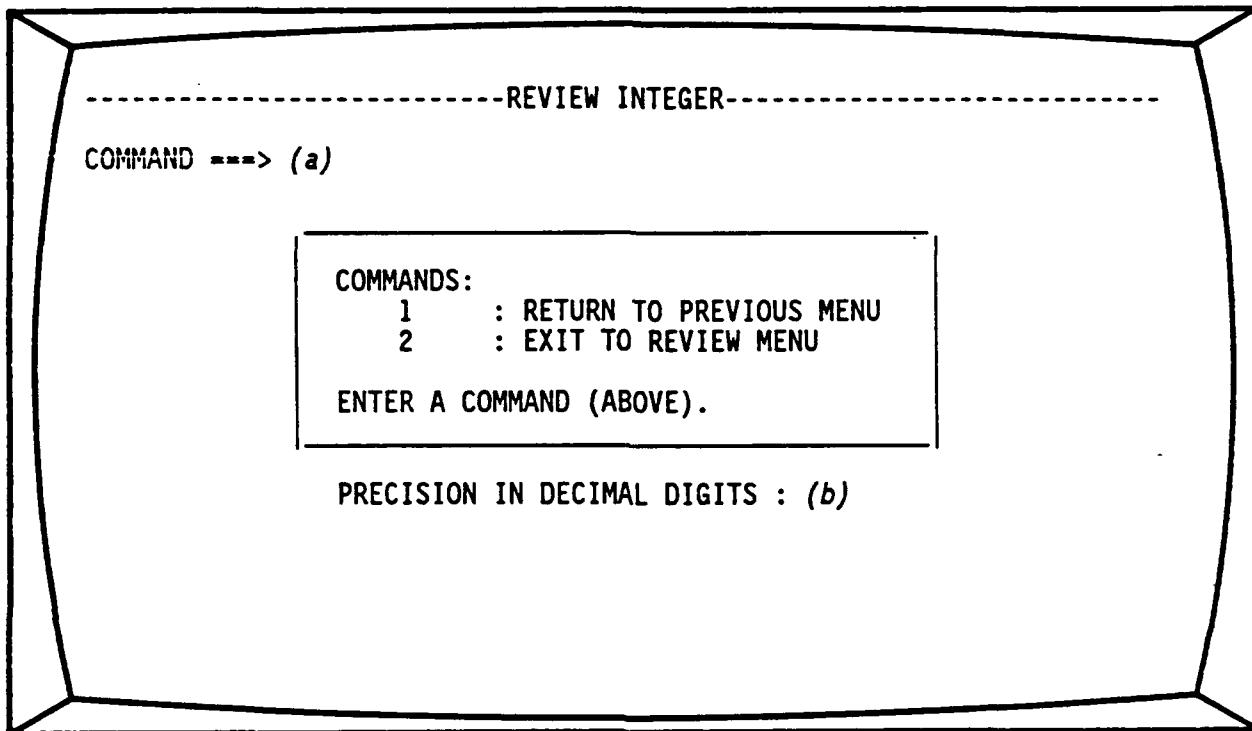


Figure 4-57 Review Integer

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the appropriate edit menu.
- (b) The integer precision in decimal digits is displayed.

Review List

The screen illustrated in Figure 4-58 displays the Review List option.

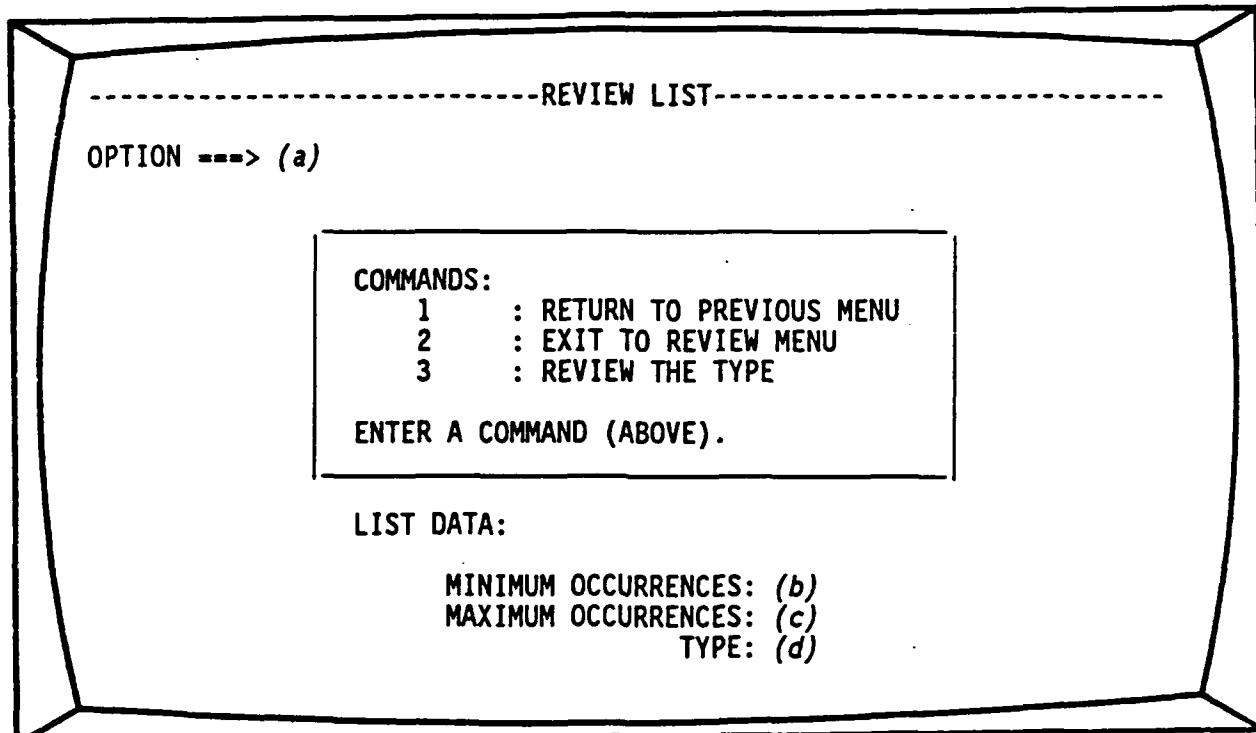


Figure 4-58 Review List

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the appropriate edit menu.
Select option 3 to display the appropriate review type menu:
REVIEW INTEGER MENU REVIEW ARRAY MENU REVIEW POINTER MENU
REVIEW REAL MENU REVIEW LIST MENU REVIEW DEFINED TYPE MENU
REVIEW STRING MENU REVIEW SET MENU
- (b) The list minimum occurrences is displayed.
- (c) The list maximum occurrences is displayed.
- (d) The list type is displayed.

Review Pointer

The screen illustrated in Figure 4-59 displays the Review Pointer option.

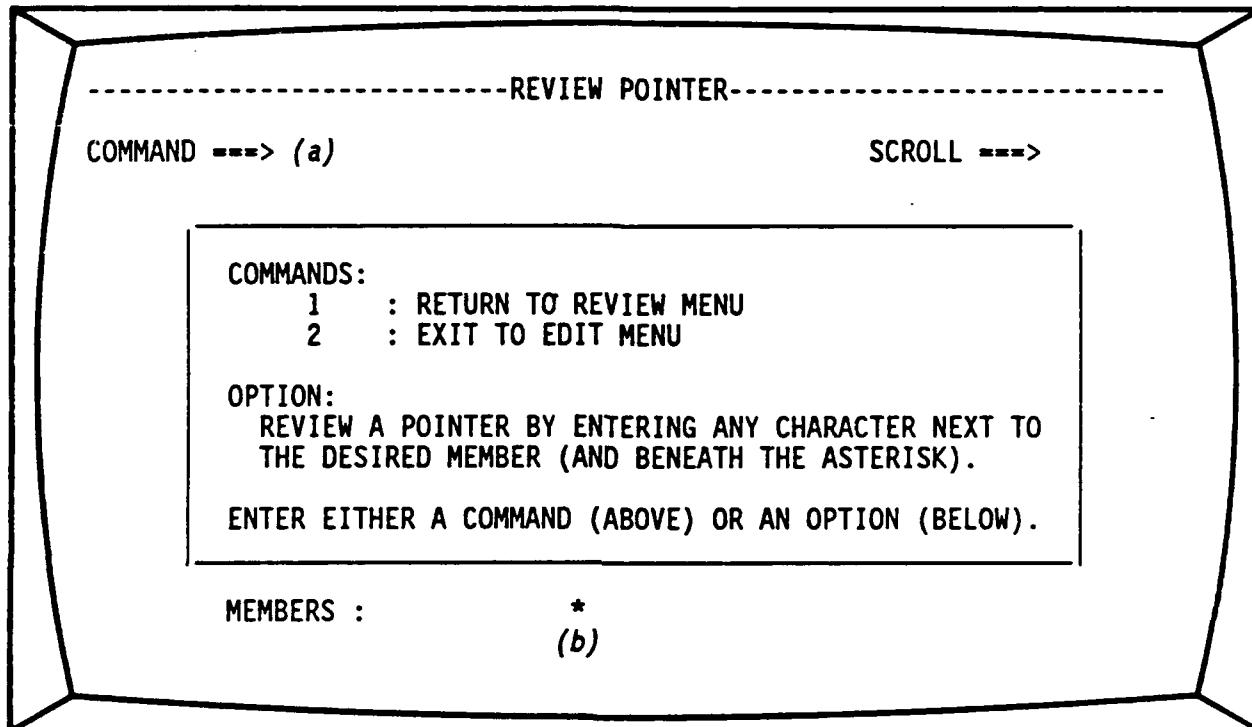


Figure 4-59 Review Pointer

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the appropriate edit menu.
- (b) A list of the pointer references (entities and classes) is displayed. Review a pointer reference by entering any character next to the desired member's name. The REVIEW ENTITY or REVIEW CLASS MENU is displayed.

Review Real

The screen illustrated in Figure 4-60 displays the Review Real option.

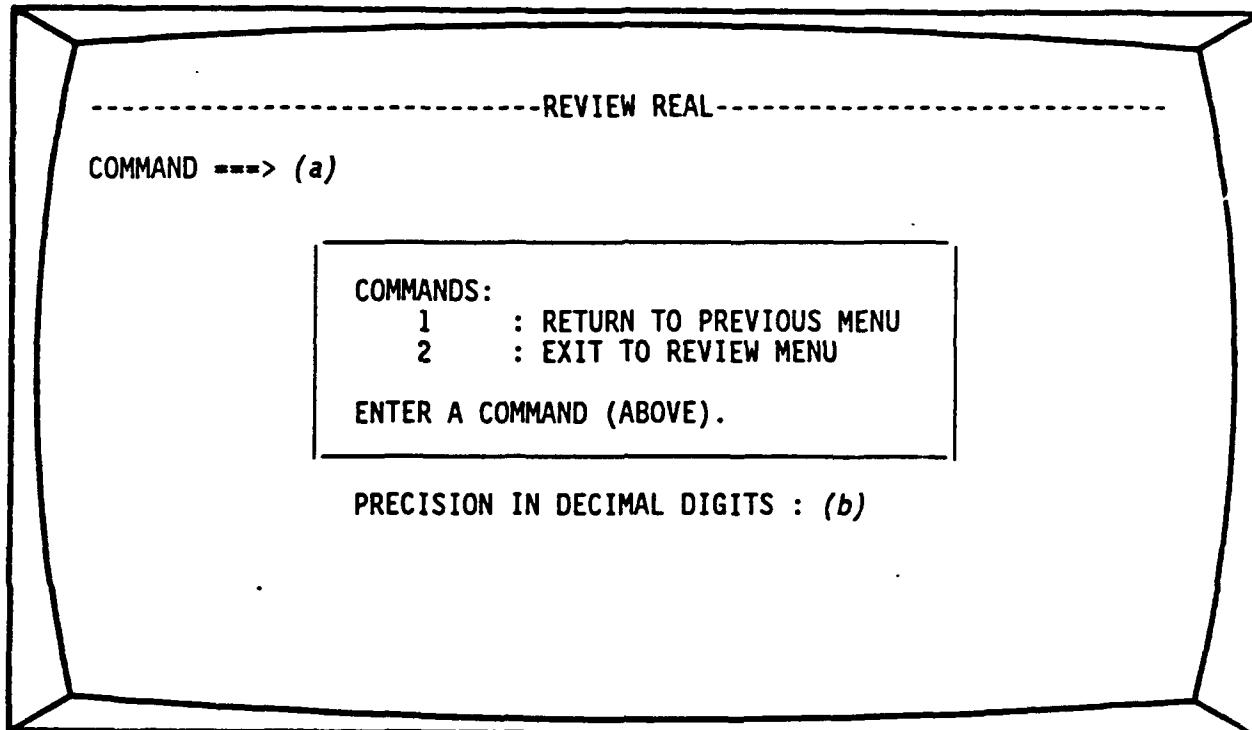


Figure 4-60 Review Real

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the appropriate edit menu.
- (b) The real precision in decimal digits is displayed.

Review Set

The screen illustrated in Figure 4-61 displays the Review Set option.

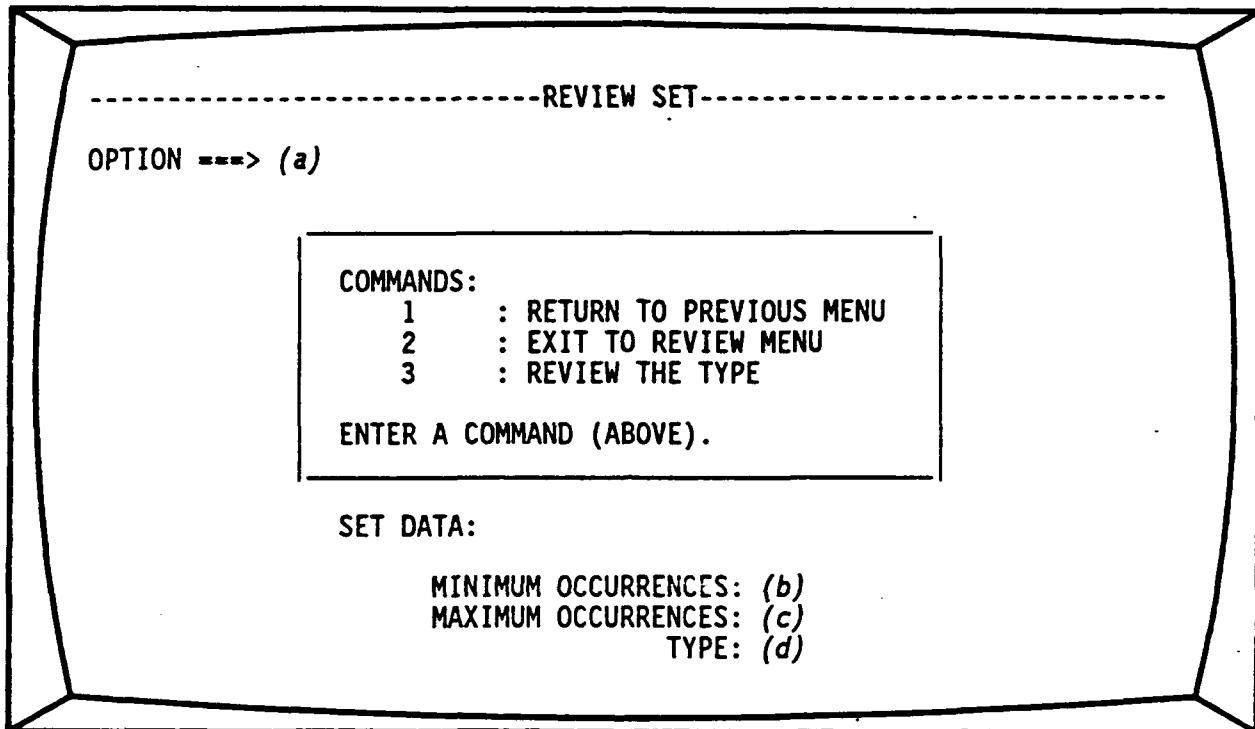


Figure 4-61 Review Set

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the appropriate edit menu.
Select option 3 to display the appropriate review type menu.
Possible review menus to be displayed include:
REVIEW INTEGER MENU REVIEW ARRAY MENU REVIEW POINTER MENU
REVIEW REAL MENU REVIEW LIST MENU REVIEW DEFINED TYPE MENU
REVIEW STRING MENU REVIEW SET MENU
- (b) The set minimum occurrences is displayed.
- (c) The set maximum occurrences is displayed.
- (d) The set type is displayed.

Review String

The screen illustrated in Figure 4-62 displays the Review String option.

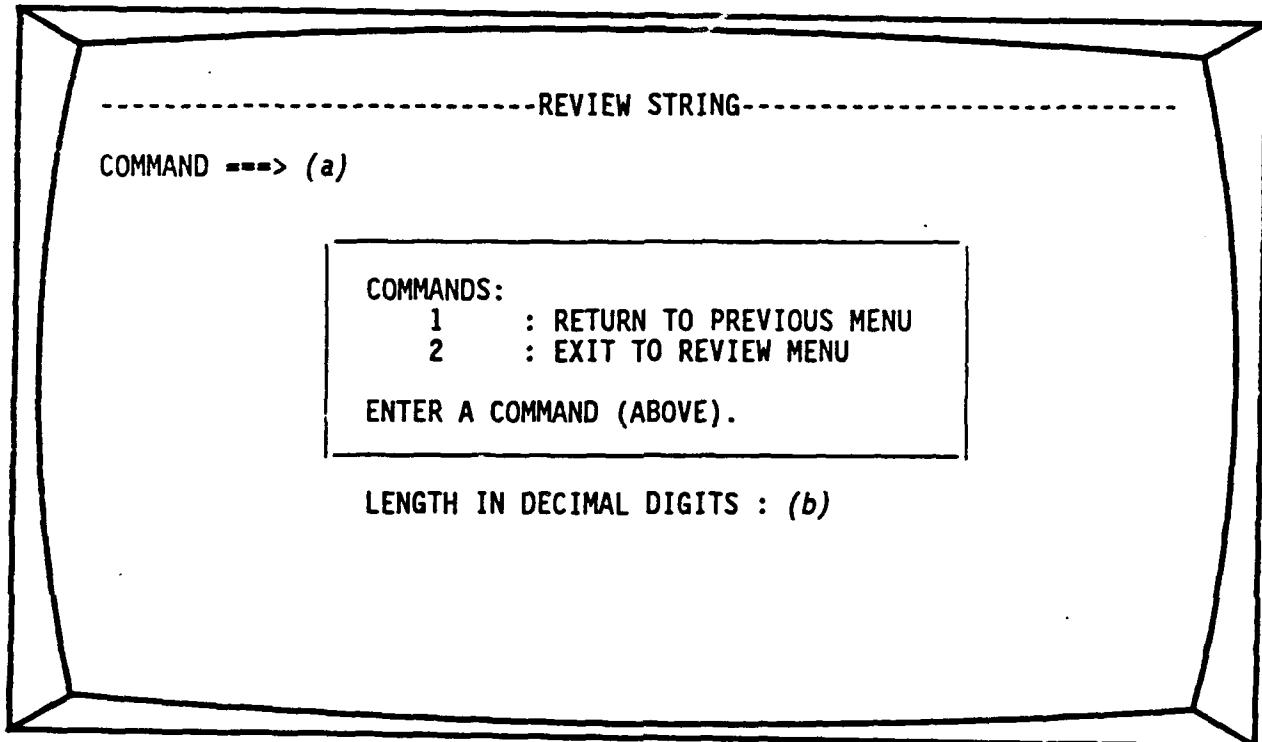


Figure 4-62 Review String

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to redisplay the appropriate edit menu.
- (b) The string length in decimal digits is displayed.

4.6 GENERATE REPORTS

When selecting command 6, Generate Reports from the MAIN MENU, the screen illustrated in Figure 4-63 is displayed.

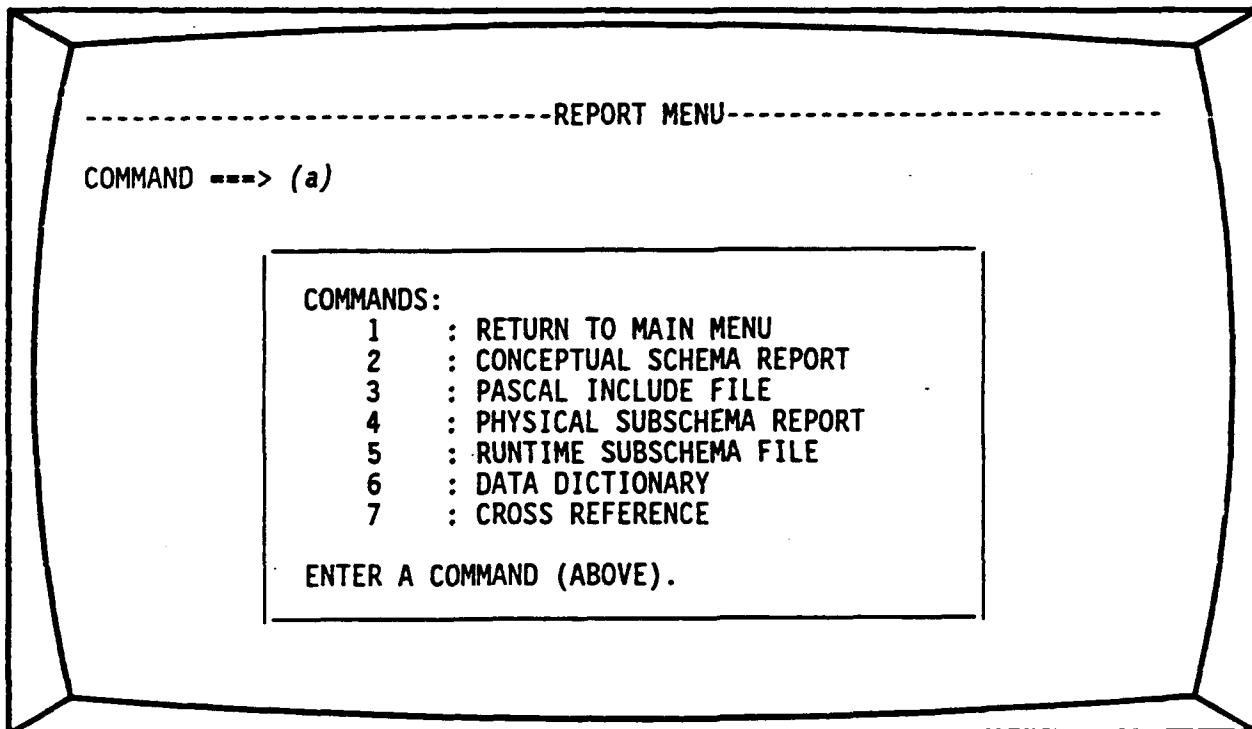


Figure 4-63 Report Menu

Menu Description:

- (a) Select option 1 to redisplay the MAIN MENU.
Select option 2 to display the CONCEPTUAL SCHEMA REPORT MENU.
Select option 3 to display the PASCAL INCLUDE FILE MENU.
Select option 4 to display the PHYSICAL SUBSCHEMA REPORT MENU.
Select option 5 to display the RUNTIME SUBSCHEMA REPORT MENU.
Select option 6 to display the DATA DICTIONARY MENU.
Select option 7 to display the CROSS REFERENCE MAIN MENU.

4.6.1 CONCEPTUAL SCHEMA REPORT

When selecting command 2, Conceptual Schema Report from the REPORT MENU, a message is displayed in the upper right corner of the REPORT MENU indicating the report was created.

4.6.2 PASCAL INCLUDE FILE

When selecting command 3, Pascal Include File from the REPORT MENU, the screen illustrated in Figure 4-64 is displayed.

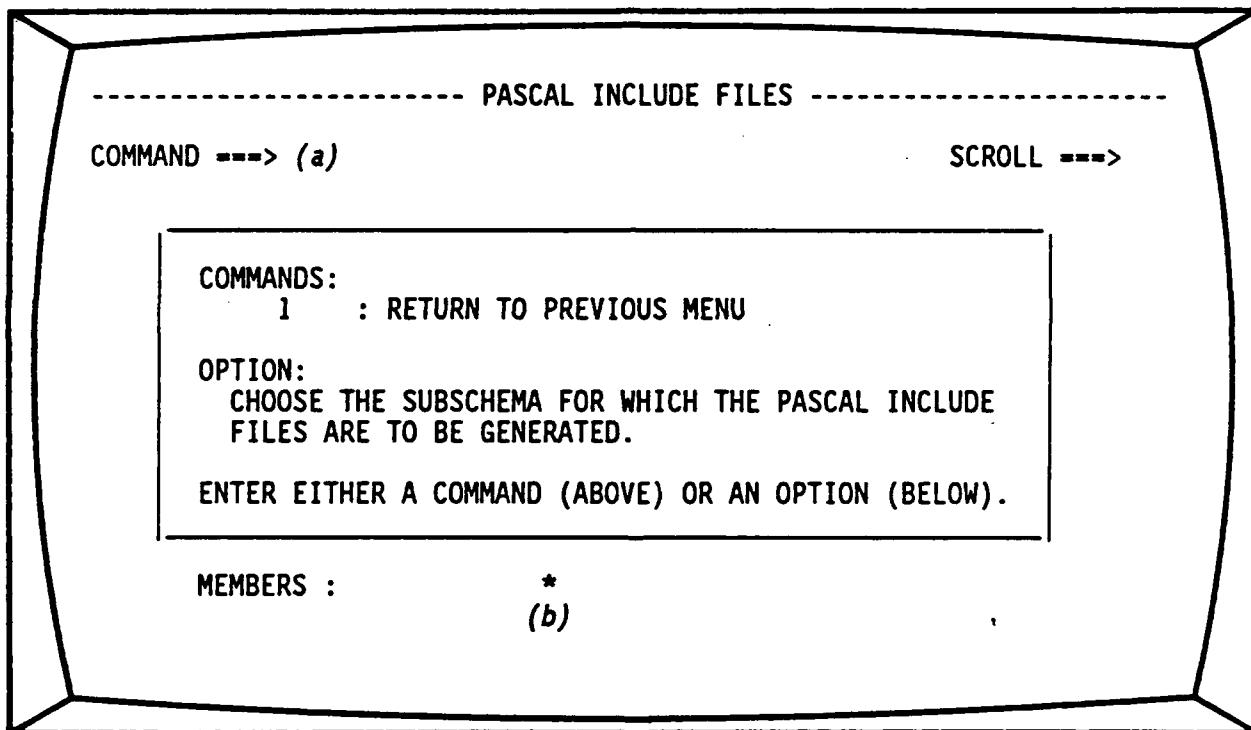


Figure 4-64 Pascal Include File

Menu Description:

- (a) Select option 1 to redisplay the REPORT MENU.
- (b) A list of the modeled subschemas is displayed. Generate a Pascal Include File for a subschema by entering any character next to the desired subschema's name.

UM560130002
22 December 1987

4.6.3 PHYSICAL SUBSCHEMA REPORT

When selecting command 4, Physical Subschema Report from the REPORT MENU, the screen illustrated in Figure 4-65 is displayed.

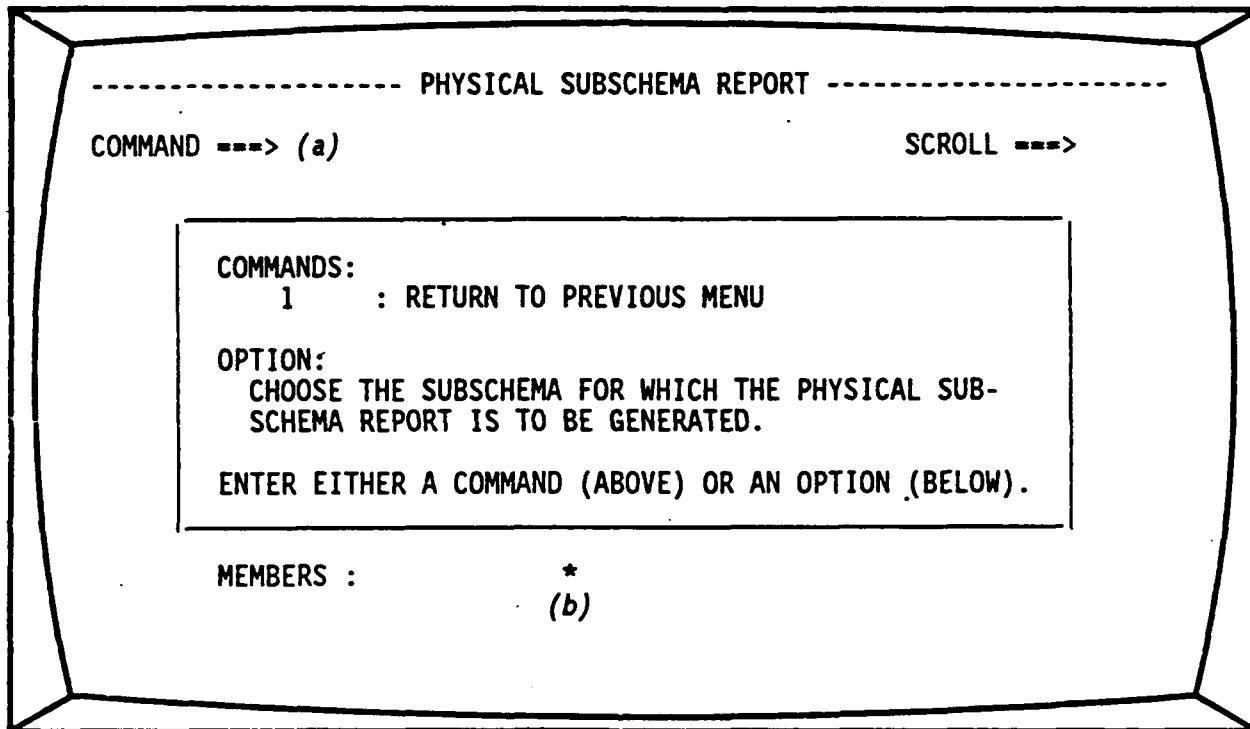


Figure 4-65 Physical Subschema Report

Menu Description:

- (a) Select option 1 to redisplay the REPORT MENU.
- (b) A list of the modeled subschemas is displayed. Generate a Physical Subschema Report for a subschema by entering any character next to the desired subschema's name.

UM560130002
22 December 1987

4.6.4 RUNTIME SUBSCHEMA FILE

When selecting command 5, Runtime Subschema File from the REPORT MENU, the screen illustrated in Figure 4-66 is displayed.

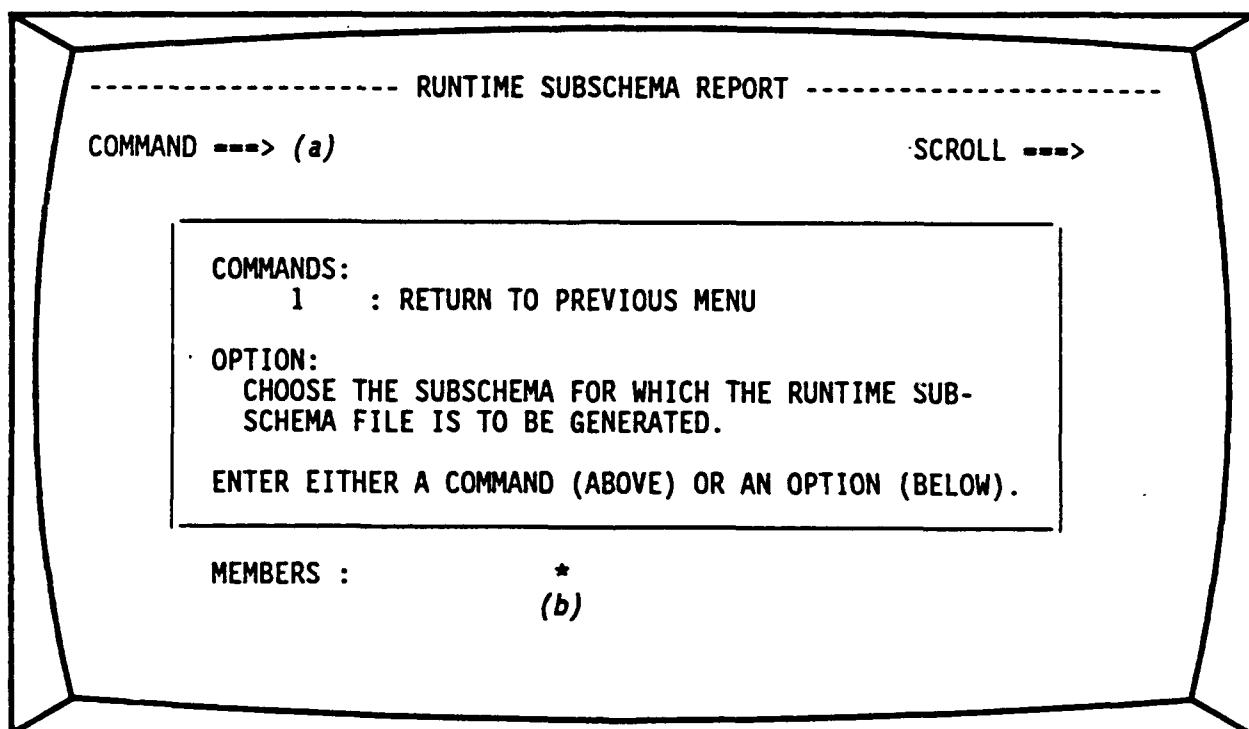


Figure 4-66 Runtime Subschema Report

Menu Description:

- (a) Select option 1 to redisplay the REPORT MENU.
- (b) A list of the modeled subschemas is displayed. Generate a Runtime Subschema Report for a subschema by entering any character next to the desired subschema's name.

4.6.5 DATA DICTIONARY

When selecting command 6, **Data Dictionary** from the **REPORT MENU**, the screen illustrated in Figure 4-67 is displayed.

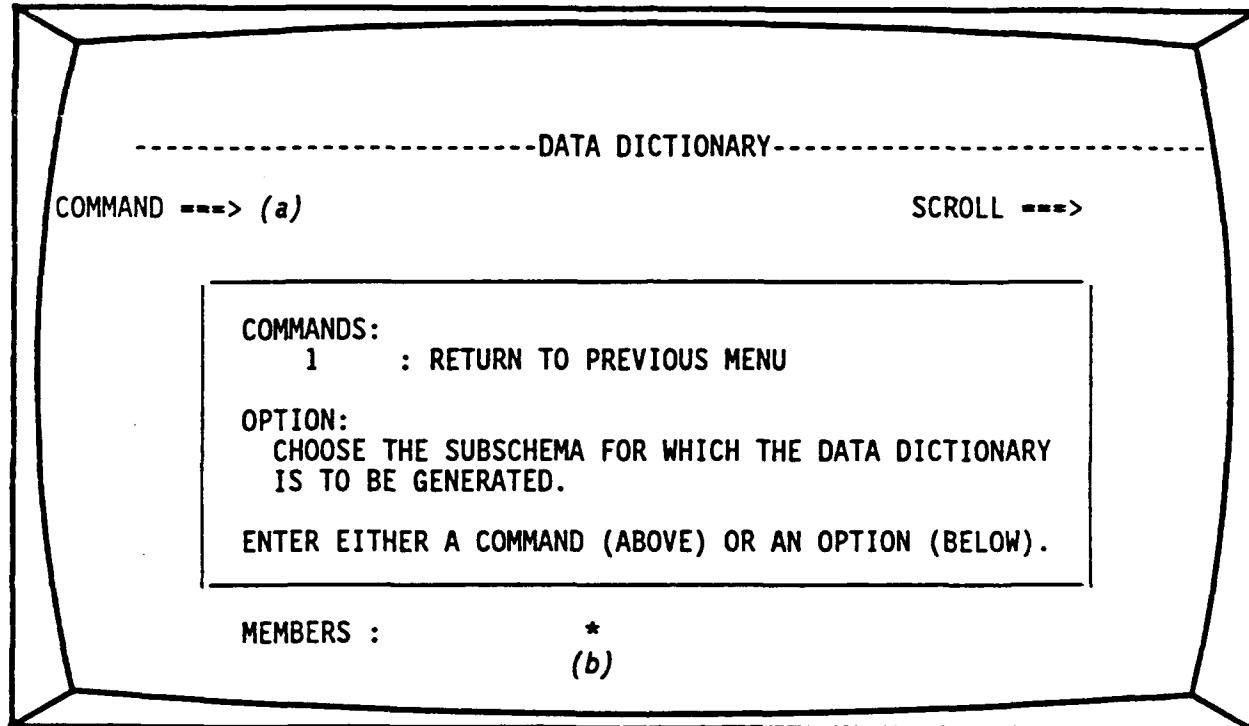


Figure 4-67 Data Dictionary

Menu Description:

- (a) Select option 1 to redisplay the REPORT MENU.
- (b) A list of the modeled subschemas is displayed. Generate a Data Dictionary for a subschema by entering any character next to the desired subschema's name.

4.6.6 CROSS REFERENCE MAIN MENU

When selecting command 7, Cross Reference from the REPORT MENU, the screen illustrated in Figure 4-68 is displayed.

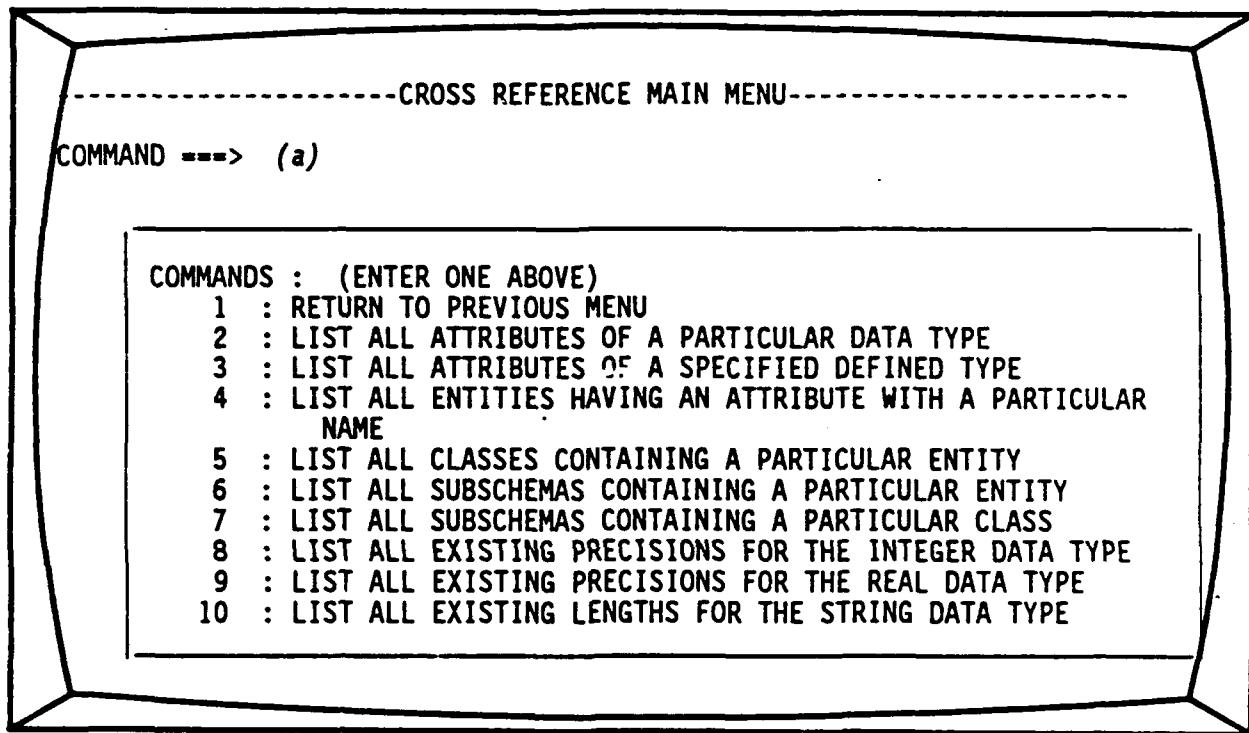


Figure 4-68 Cross Reference Main Menu

Menu Description:

- (a) Select option 1 to redisplay the REPORT MENU.
- Select option 2 to display the DATA TYPE SPECIFICATION MENU.
- Select option 3 to display the SPECIFICATION MENU.
- Select option 4 to display the SPECIFICATION MENU.
- Select option 5 to display the SPECIFICATION MENU.
- Select option 6 to display the SPECIFICATION MENU.
- Select option 7 to display the SPECIFICATION MENU.
- Select option 8 to display the CROSS REFERENCE REPORT MENU.
- Select option 9 to display the CROSS REFERENCE REPORT MENU.
- Select option 10 to display the CROSS REFERENCE REPORT MENU.

UM560130002
22 December 1987

The Cross Reference Report Function accesses five additional menus within the Schema Manager. These five menus include:

- Data Type Specification
- Precision Specification Menu
- Length Specification
- Specification
- Cross Reference Report Menu

These menus are described on the following pages.

Data Type Specification

When selecting command 2, List all Attributes of a Particular Data Type, from the CROSS REFERENCE MAIN MENU, the screen illustrated in Figure 4-69 is displayed.

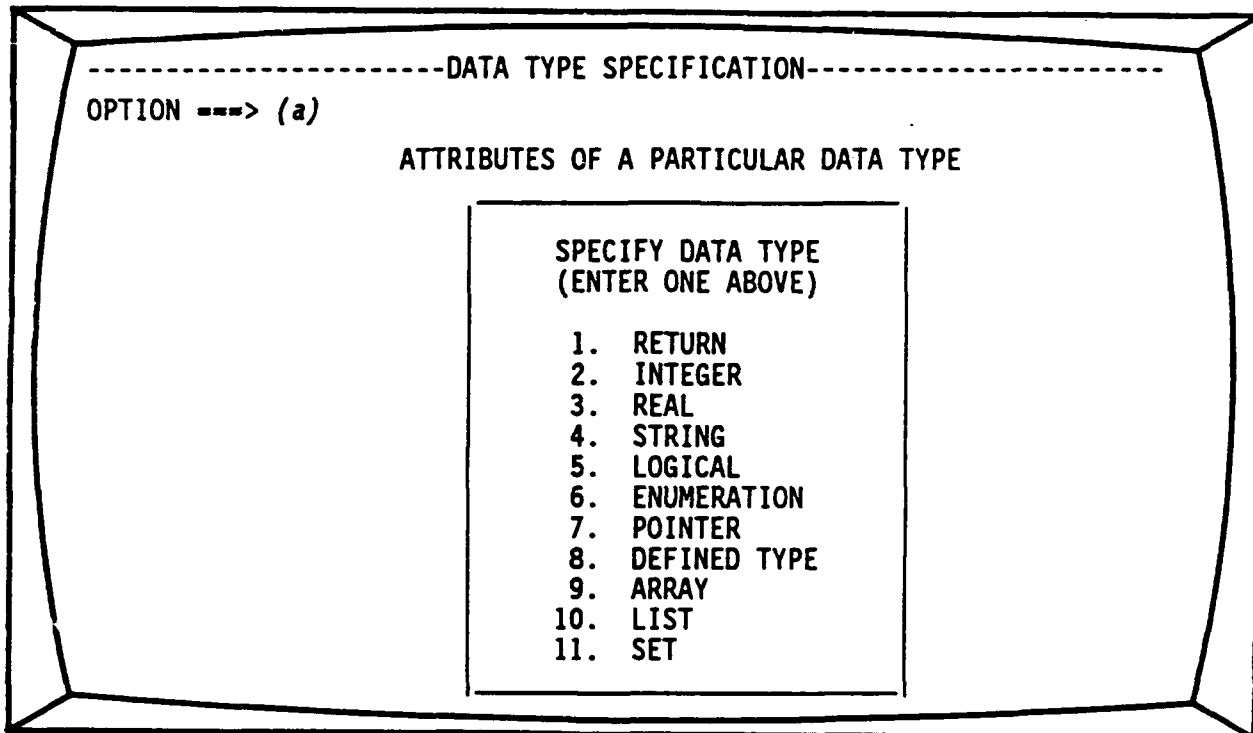


Figure 4-69 Data Type Specification

Menu Description:

(a) Select option 1 to redisplay the CROSS REFERENCE MAIN MENU.
Select option 2 to display the PRECISION SPECIFICATION MENU.
Select option 3 to display the PRECISION SPECIFICATION MENU.
Select option 4 to display the LENGTH SPECIFICATION MENU.
Select option 5 to display the CROSS REFERENCE REPORT MENU.
Select option 6 to display the CROSS REFERENCE REPORT MENU.
Select option 7 to display the CROSS REFERENCE REPORT MENU.
Select option 8 to display the CROSS REFERENCE REPORT MENU.
Select option 9 to display the CROSS REFERENCE REPORT MENU.
Select option 10 to display the CROSS REFERENCE REPORT MENU.
Select option 11 to display the CROSS REFERENCE REPORT MENU.

Precision Specification Menu

When selecting commands 2 or 3 from the DATA TYPE SPECIFICATION screen, the menu illustrated in Figure 4-70 is displayed.

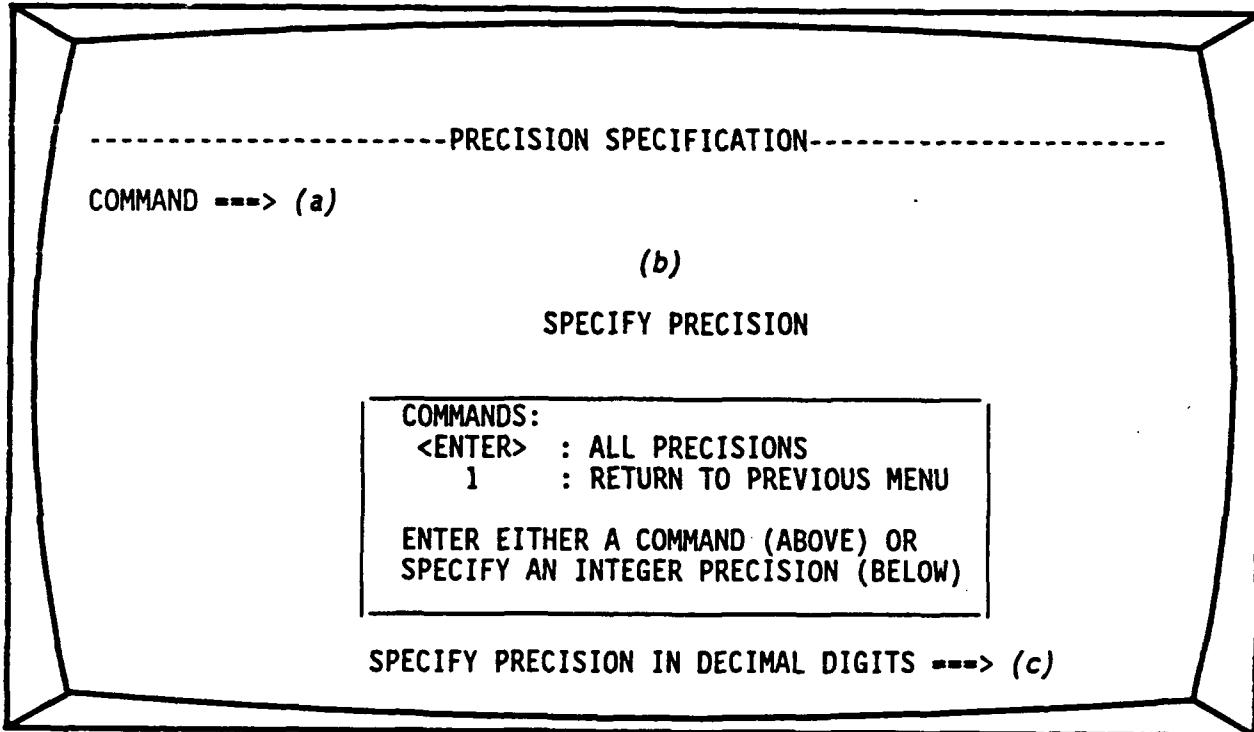


Figure 4-70 Precision Specification

Menu Description:

- (a) Press the <ENTER> key to display all existing integer or real precisions. Select option 1 to redisplay the previous menu.
- (b) A description of the type of precision (integer or real).
- (c) Specify a precision in integer digits. If the request is satisfied, the CROSS REFERENCE REPORT MENU will be displayed.

Length Specification

The screen illustrated in Figure 4-71 displays the Length Specification Menu option.

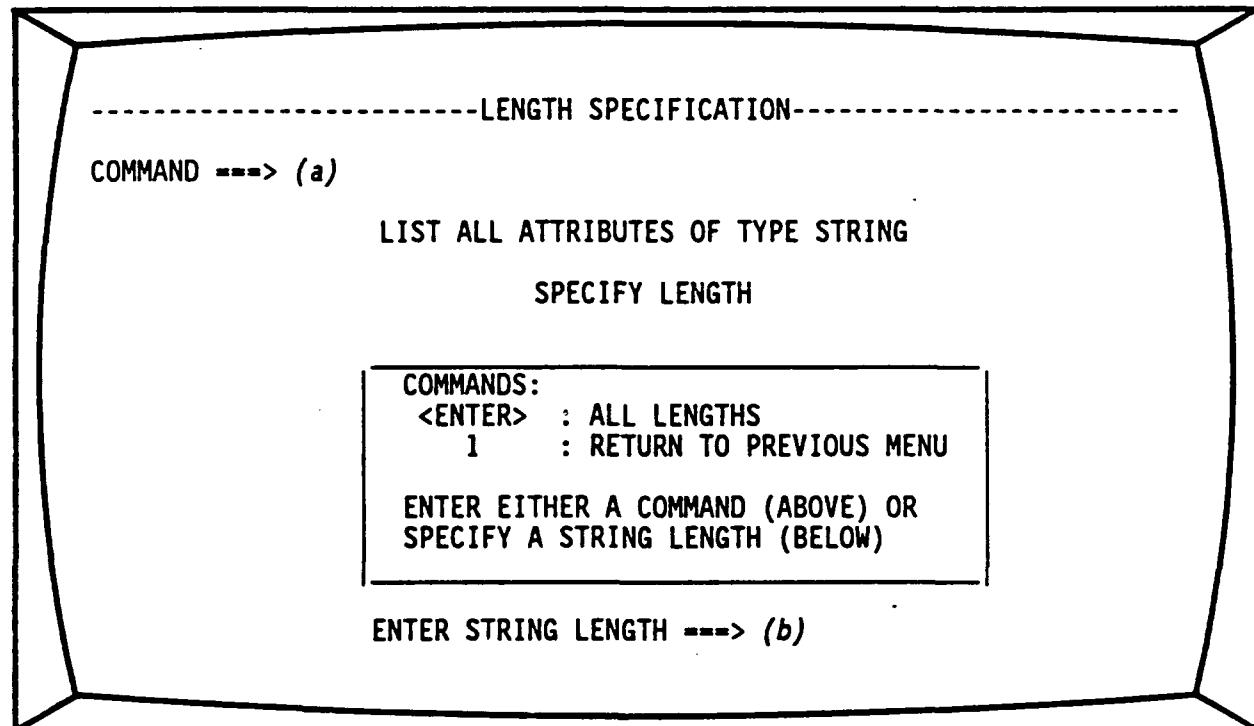


Figure 4-71 Length Specification

Menu Description:

- (a) Press the <ENTER> key to display all existing string lengths. Select option 1 to redisplay the previous menu.
- (b) Specify a string length in integer digits. If the request is satisfied, the CROSS REFERENCE REPORT MENU will be displayed.

Specification

The screen illustrated in Figure 4-72 displays the Specification Menu option.

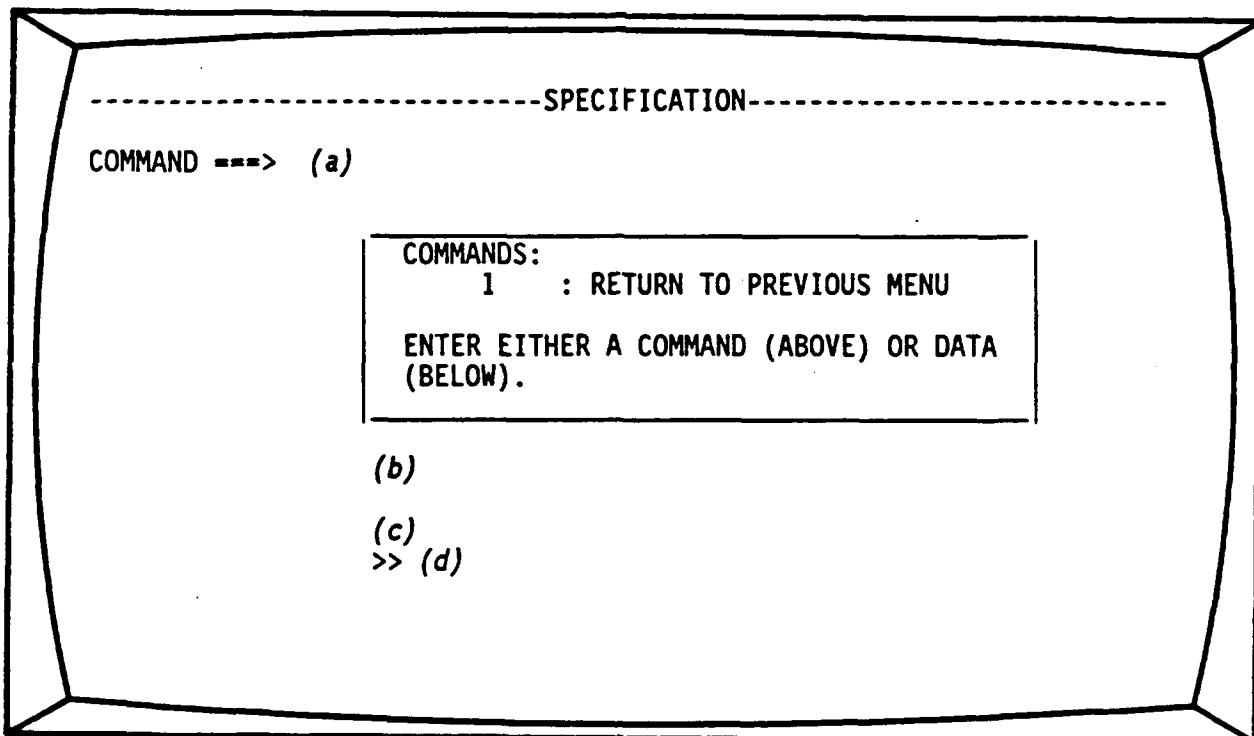


Figure 4-72. Specification

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
- (b) A description of the request selected from the previous menu.
- (c) A description of the name or kind number to be entered.
- (d) Specify a name or kind number for which a search is to be conducted. If the request is satisfied, the CROSS REFERENCE REPORT MENU will be displayed.

UM560130002
22 December 1987

Cross Reference Report

When selecting command 8, 9, or 10, from the CROSS REFERENCE MAIN MENU, the screen illustrated in Figure 4-73 is displayed.

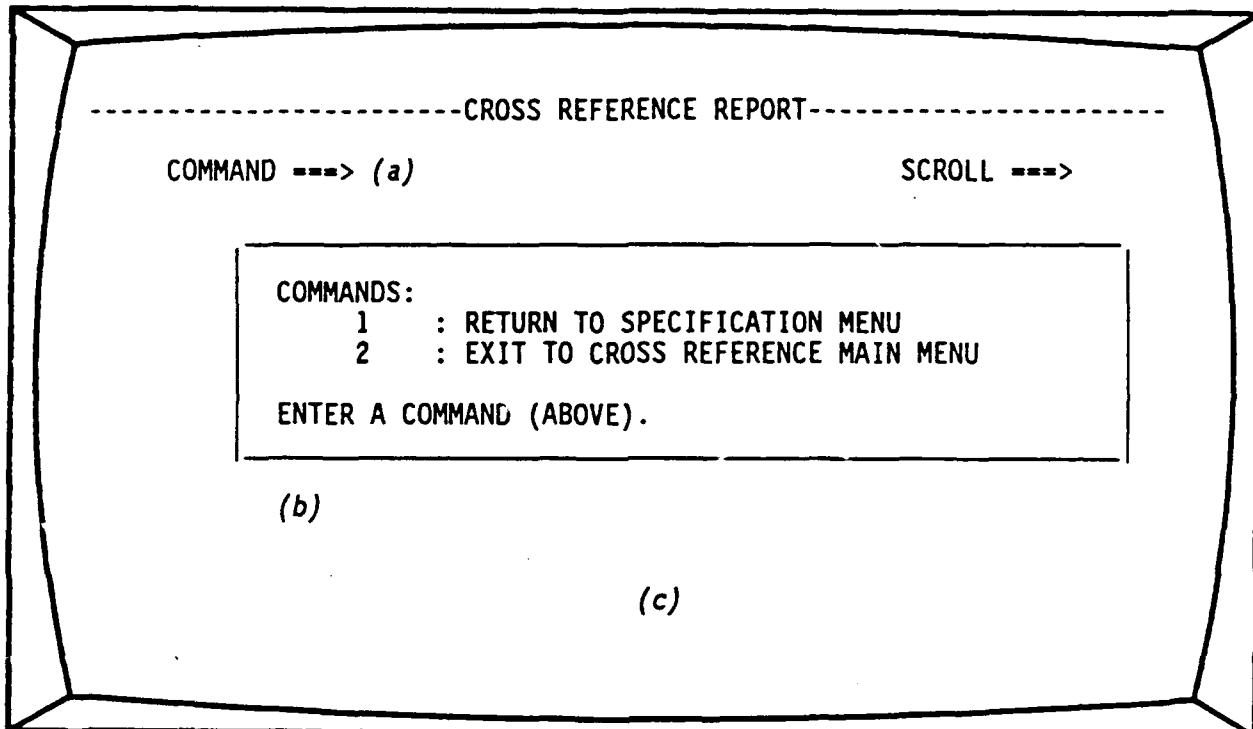


Figure 4-73 Cross Reference Report

Menu Description:

- (a) Select option 1 to redisplay the SPECIFICATION MENU.
Select option 2 to redisplay the CROSS REFERENCE MAIN MENU.
- (b) A description of the list created.
- (c) Appropriate headings and the results satisfying the request are displayed.

4.7 FILE MODEL TO DISK

When selecting command 7, **File Model to Disk** from the **MAIN MENU**, the filing process is automatically performed. A message is displayed in the upper right corner of the display screen.

SECTION 5

GENERATED REPORTS AND FILES

The Schema Manager Software REPORT MENU has the options to generate the following six reports or files:

- Conceptual Schema Report
- Pascal Include File
- Physical Subschema Report
- Runtime Subschema File
- Data Dictionary
- Cross Reference

5.1 CONCEPTUAL SCHEMA REPORT

The Conceptual Schema Report (CSR) shows all the definitions in the schema model, which include:

- defined types
- global attributes
- inherited attribute groups (supertypes)
- entities
- classes
- subschemas

The report includes indices to the definitions for inherited attributes, entities, classes, and subschemas. The format of the report entries is based on the EXPRESS information modeling language, as shown in Figures 5-1 through 5-13.

Each defined type, as illustrated in Figures 5-1, is equivalent to one of the following data types:

- primitive (integer, real, string, logical, pointer)
- complex primitive (enumeration)
- aggregation (array, list, set)
- another defined type based on a primitive, complex primitive, or aggregation data type

The keyword TYPE is followed by the defined type name. An equal sign serves as the delimiter between the name and type. A semicolon ends each definition.

--PAGE 1

```
(*-----*)  
(*----- DEFINED TYPE DEFINITIONS -----*)  
(*-----*)  
  
TYPE DOUBLE_REAL      = REAL(15);  
  
TYPE FULL_PARTIAL     = ENUMERATION OF  
                         (FULL  
                          PARTIAL      );  
  
TYPE NSE_CODES        = ENUMERATION OF  
                         (REQUIRED      ,  
                          OPTIONL      ,  
                          UOS          ,  
                          GLOBL         ,  
                          EXCEPTION    ,  
                          ALTERNATIVE  ,  
                          INFORMATION  );  
  
TYPE RB_SPLINE_CODE   = ENUMERATION OF  
                         (UNDETERMINED  ,  
                          LINEAR_ARC   ,  
                          CIRCULAR_ARC ,  
                          ELLIPTICAL_ARC ,  
                          PARABOLIC_ARC ,  
                          HYPERBOLIC_ARC );  
  
TYPE SHORT_INTEGER     = INTEGER(4);
```

Figure 5-1 Conceptual Schema Report - Defined Type Definitions

Each global attribute, as illustrated in Figure 5-2, is defined by a data type. The keyword GLOBAL is followed by the global attribute name. A colon serves as the delimiter between the name and type. INTEGER and REAL data types are followed by the number of digits of precision enclosed in parenthesis; the STRING data type is followed by the number of characters of length enclosed in parenthesis. A semi-colon ends each definition.

--PAGE 2

```
(*-----*)  
(*      GLOBAL ATTRIBUTE DEFINITIONS      *)  
(*-----*)
```

```
GLOBAL IDENT      : INTEGER(8);
```

Figure 5-2 Conceptual Schema Report - Global Attribute Definitions

Each inherited attribute group (supertype), as illustrated in Figure 5-2, is defined by the list of attributes. The keyword SUPERTYPE is followed by the supertype name and a semicolon. The attributes are then defined. Each attribute name is followed by a colon and the attribute type. The supertype definition is concluded with the keyword END_SUPERTYPE and a semicolon.

--PAGE 3

```
(*-----*)  
(*      SUPERTYPE DEFINITION      *)  
(*-----*)
```

```
SUPERTYPE GROUPING      ;  
X                      : REAL(16);  
Y                      : REAL(16);  
Z                      : REAL(16);  
END_SUPERTYPE;
```

Figure 5-3 Conceptual Schema Report - Supertype Definitions

An inherited attribute group may also refer to another inherited attribute group, which is higher in the hierarchy. In this case the supertype name is followed by the keywords SUBTYPE OF and the higher supertype name enclosed in parentheses, as illustrated in Figure 5-4.

--PAGE 4

```
(*-----*)  
(*-----*)  
(*-----*)  
SUPERTYPE DEFINITION  
(*-----*)  
(*-----*)  
SUPERTYPE COLLECTOR      SUBTYPE OF (GROUPING      );  
  A                      : STRING(10);  
  B                      : LOGICAL;  
END_SUPERTYPE;
```

Figure 5-4 Conceptual Schema Report - Supertype Definition

Each entity is defined by the list of its attributes, as illustrated in Figure 5-5. The keyword ENTITY is followed by the entity name, entity kind number enclosed in parentheses, and a semicolon. The entity attributes are then defined. Each attribute name is followed by a colon and the attribute type. The entity definition is concluded with the keyword END_ENTITY and a semicolon.

--PAGE 5

```
(*-----*)  
(*          ENTITY DEFINITION          *)  
(*-----*)  
  
ENTITY AIRFLOW      (938) ;  
APPLICATION        : NSE_CODES      ;  
PROP_REFS          : LIST(0..255) OF POINTER TO  
                      (PROPRTY        );  
INSP_CONTROLS     : LIST(1..10) OF POINTER TO  
                      (INSP_CONTROL   );  
AIRFLOW_KIND       : FULL_PARTIAL    ;  
MAX_PRES_RATIO    : DOUBLE_REAL    ;  
MIN_PRES_RATIO    : DOUBLE_REAL    ;  
AIRFLOW_PARM       : DOUBLE_REAL    ;  
BLOCKS             : LIST(0..255) OF POINTER TO  
                      (BLOCK          );  
END_ENTITY;
```

Figure 5-5 Conceptual Schema Report - Entity Definition

An entity may also refer to an inherited attribute group. In this case, the keywords SUBTYPE OF and the supertype name enclosed in parentheses follows the entity kind number, as illustrated in Figure 5-6.

--PAGE 6

```
(*-----*)  
(*-----*) ENTITY DEFINITION (*-----*)  
(*-----*)  
ENTITY RB_SPLINE2      (225) SUBTYPE OF (GROUPING      );  
  CRV_IND           : RB_SPLINE_CODE      ;  
  DEGREE            : SHORT_INTEGER      ;  
  KNOTS             : LIST(2..125) OF DOUBLE_REAL      ;  
  NO_KNOTS          : SHORT_INTEGER      ;  
  PERIODIC          : LOGICAL;  
  WEIGHTS            : LIST(2..125) OF DOUBLE_REAL      ;  
  NO_WEIGHTS         : SHORT_INTEGER      ;  
  CTRL PTS          : LIST(2..125) OF POINTER TO  
                      (SPLINE_POINT2      );  
END_ENTITY;
```

Figure 5-6 Conceptual Schema Report - Entity Definition

A class is defined by a list of entities and/or classes. The keyword CLASS is followed by the class name, class kind number enclosed in parentheses, and a semicolon. The class members are then listed. Each member name is followed by a semicolon, two dashes, and the member kind number and type (entity or class). The class definition is concluded with the keyword END_CLASS and a semicolon. The class definition is illustrated in Figure 5-7.

--PAGE 7

```
(*-----*)  
(*-----*)  
(*-----*)  
CLASS DEFINITION  
(*-----*)  
(*-----*)  
(*-----*)  
CLASS INSP_TECHNIQUE (974);  
AIRFLOW ; -- 938 ENTITY  
END_CLASS;
```

Figure 5-7 Conceptual Schema Report - Class Definition

A subschema is defined by a list of entities and/or classes, as illustrated in Figure 5-8. The keyword SUBSCHEMA is followed by the subschema name and a semicolon. The subschema members are then listed. Each member name is followed by a semicolon, two dashes, and the member kind number and type (entity or class). The subschema definition is concluded with the keyword END_SUBSCHEMA and a semicolon.

--PAGE 8

```
(*-----*)  
(*-----*)  
(*-----*)  
SUBSCHEMA DEFINITION  
(*-----*)  
(*-----*)  
(*-----*)  
SUBSCHEMA GMAP  
RB_SPLINE2 ; -- 225 ENTITY  
AIRFLOW ; -- 93E ENTITY  
OPEN_CURVE2 ; -- 222 CLASS  
INSP_TECHNIQUE ; -- 974 CLASS  
END_SUBSCHEMA;
```

Figure 5-8 Conceptual Schema Report - Subschema Definition

UM560130002
22 December 1987

All of the supertypes are listed in alphabetical order. The name is followed by the report page number for the supertype definition. The Supertype Index function is illustrated in Figure 5-9.

--PAGE 9		
(*-----*)		
(*-----*)		
(*-----*)		
SUPERTYPE INDEX		
COLLECTOR	PAGE 3
GROUPING	PAGE 4

Figure 5-9 Conceptual Schema Report - Supertype Index

All of the entities are listed in alphabetical order. The name is followed by the kind number and the report page number for the entity definition. The Entity Index function is illustrated in Figure 5-10.

--PAGE 10		
(*-----*)		
(*-----*)		
(*-----*)		
ENTITY INDEX		
AIRFLOW	(938).....	PAGE 5
RB_SPLINE2	(225).....	PAGE 6

Figure 5-10 Conceptual Schema Report - Entity Index

UM560130002
22 December 1987

All of the classes are listed in alphabetical order. The name is followed by the kind number and the report page number for the class definition. The Class Index function is illustrated in Figure 5-11.

--PAGE 11		
(*-----*) (*-----*) (*-----*)		
INSP_TECHNIQUE	(974).....	PAGE 7
OPEN_CURVE2	(222).....	PAGE 8

Figure 5-11 Conceptual Schema Report - Class Index

All of the subschema definitions are listed in alphabetical order. The name is followed by the report page number for the subschema definition. The Subschema Index function is illustrated in Figure 5-12.

--PAGE 12		
(*-----*) (*-----*) (*-----*)		
GMAP	PAGE 8

Figure 5-12 Conceptual Schema Report - Subschema Index

5.2 PASCAL INCLUDE FILES

The first lines in the file indicate which subschema the Pascal Include Files were being generated from.

```
{*****  
(* PASCAL INCLUDE FILES *)  
(* FOR THE APPLICATION SUBSCHEMA GMAP *)  
*****}
```

The contents of the file are outlined.

```
{*****  
(* THE PASCAL INCLUDE FILES CONTAIN *)  
(* THE BASIC TYPES AND THEIR IMPLEMENTATION *)  
(* THE DEFINED TYPE DECLARATIONS *)  
(* THE ENTITY KIND CONSTANTS *)  
(* THE ENTITY ADB AND CONSTITUENT DEFINITIONS *)  
(* THE MAS ENTBLOCK DECLARATION *)  
(* THE KEYBLOCK CONSTITUENT DEFINITION *)  
*****}
```

The kind constants are established for each entity.

```
{*****  
(* ENTITY KIND CONSTANTS *)  
*****}
```

CONST

K_ARRAY_ENTITY	=	1100 ;
K_AIRFLOW	=	938 ;
K_RB_SPLINE2	=	225 ; 1

The basic types and their IBM Pascal implementation are described.

```
(*****  
(* BASIC TYPES: IMPLEMENTED IN IBM PASCAL AS: *)  
(*  
(* INTEGER (1 BYTE) PACKED 0..255 *)  
(* INTEGER (2 BYTFS) PACKED 0..65535 *)  
(* INTEGER (4 BYTES) INTEGER *)  
(* REAL (4 BYTES) SHORTREAL *)  
(* REAL (8 BYTES) REAL *)  
(* STRING (N BYTES) PACKED ARRAY(.1..N.) OF CHAR *)  
(* BOOLEAN LOGICAL *)  
(* ENUMERATION ENUMERATED SCALAR *)  
*****)
```

The defined types are declared as described above. `T_CL_POSITION` is automatically generated.

```
(*****  
(* DEFINED TYPE DECLARATIONS *)  
*****)
```

```
TYPE  
  
  T_CL_POSITION      = INTEGER;  
  
  T_DOUBLE_REAL      = REAL;  
  
  T_FULL_PARTIAL     = ( FULL  
                         PARTIAL );  
  
  T_NSE_CODES        = ( REQUIRED  
                         OPTIONAL  
                         UOS  
                         GLOBL  
                         EXCEPTION  
                         ALTERNATIVE  
                         INFORMATION );  
  
  T_RB_SPLINE_CODE   = ( UNDETERMINED  
                         LINEAR_ARC  
                         CIRCULAR_ARC  
                         ELLIPTICAL_ARC  
                         PARABOLIC_ARC  
                         HYPERBOLIC_ARC );  
  
  T_SHORT_INTEGER     = PACKED 0..65535;
```

The array entity is automatically generated. See the AIRFLOW entity for a description of the entity declarations.

```
(*****)
(* ENTITY DECLARATIONS *)
(*****)

(*****)
(* ARRAY_ENTITY *)
(*****)

TYPE

  P_ARRAY_ENTITY      = RECORD
    CL_ENTITIES        : ENTKEY;
  END;

  S_ARRAY_ENTITY      = RECORD
    CL_ENTITIES        : T_CL_POSITION;
  END;

CONST

  C_ARRAY_ENTITY      = S_ARRAY_ENTITY (1); 1
```

```
(*****)
(* AIRFLOW *)
(*****)

TYPE

  E_AIRFLOW           = RECORD
    MAX_PRES_RATIO    : T_DOUBLE_REAL    ;
    MIN_PRES_RATIO    : T_DOUBLE_REAL    ;
    AIRFLOW_PARM      : T_DOUBLE_REAL    ;
    APPLICATION        : T_NSE_CODES     ;
    AIRFLOW_KIND       : T_FULL_PARTIAL  ;
  END;

  P_AIRFLOW           = RECORD
    PROP_REFS          : ENTKEY;
    INSP_CONTROLS     : ENTKEY;
    BLOCKS             : ENTKEY;
  END;
```

A structured constant for constituent list positions (IBM specific) is defined. All of the entity's local and inherited constituent attributes (pointer types) are included.

```
S_AIRFLOW      = RECORD
  PROP_REFs    : T_CL_POSITION;
  INSP_CONTROLS : T_CL_POSITION;
  BLOCKS       : T_CL_POSITION;
END;
```

The constant statement (IBM Pascal peculiar) assigns values to the record fields defined above. (PROP_REFs is assigned the value of 1, INSP_CONTROLS is assigned the value of 2, and BLOCKS is assigned the value of 3.)

A user can reference a constituent using the MAS routine MALGTK in the following way:

```
MALGTK( AIRFLOW_KEY, S_AIRFLOW.PROP_REFs, PROP_REFs_KEY, XRC )
```

S_AIRFLOW.PROP_REFs represents the position of the constituent in the constituent list. If the constituent's position were to later change, a new Pascal Include File could be generated. No change would be necessary to the application program.

```
CONST
  C_AIRFLOW      = S_AIRFLOW      ( 1 ,
                                         2 ,
                                         3 ); 1
```

A variant portion of the MAS ENTBLOCK is declared. All of the entity's local and inherited ADB attributes (non-pointer types) are included.

The variant portion of the KEYBLOCK is declared. All of the entity's local and inherited constituent attributes (pointer types) are included.

Below is another example of an entity declaration.

```
(*#####
(* RB SPLINE2 *)
(*#####)

TYPE

  E_RB_SPLINE2      = RECORD
    KNOTS            : ARRAY(. 1 .. 125 .) OF
                      T_DOUBLE_REAL ;
    WEIGHTS          : ARRAY(. 1 .. 125 .) OF
                      T_DOUBLE_REAL ;
    DEGREE           : T_SHORT_INTEGER ;
    NO_KNOTS         : T_SHORT_INTEGER ;
    NO_WEIGHTS       : T_SHORT_INTEGER ;
    CRV_IND          : T_RB_SPLINE_CODE ;
    PERIODIC         : BOOLEAN;
  END;

  P_RB_SPLINE2      = RECORD
    CTRL PTS        : ENTKEY;
  END;

  S_RB_SPLINE2      = RECORD
    CTRL PTS        : T_CL_POSITION;
  END;

CONST

  C_RB_SPLINE2      = S_RB_SPLINE2 ( 1 ); 1
```

The ENTBLOCK declaration contains two portions:

- 1) The fixed portion, which includes the automatically generated KIND, LENGTH, and SYSUSE fields and the user defined global fields (IDENT).
- 2) The variant portion, which includes each entity record as previously declared.

```
(*****  
(* MAS ENTBLOCK DECLARATIONS *)  
*****)  
  
TYPE  
  
  ENTBLOCK = RECORD  
    KIND      : INTEGER;  
    LENGTH    : INTEGER;  
    SYSUSE   : INTEGER;  
    IDENT    : INTEGER;  
    CASE KIND : OF  
      K_ARRAY_ENTITY    : ();  
      K_AIRFLOW          : (AIRFLOW           : E_AIRFLOW );  
      K_RB_SPLINE2       : (RB_SPLINE2       : E_RB_SPLINE2 );  
  END;
```

UM560130002
22 December 1987

The KEYBLOCK declaration contains a record for each entity's local and inherited constituent attributes (pointer types) as previously declared.

A user can reference a constituent using the MAS routine MALGET in the following way:

```
MALGET( AIRFLOW_KEY, CL_KEY, XRC )
```

CL_KEY is the returned keyblock of the AIRFLOW entity. CL_KEY.AIRFLOW.PROPREFS is the key to PROP_REFs. The ADB of PROP_REFs can be referenced using the MAS routine MAEGTK in the following way:

```
MAEGTK( CL_KEY.AIRFLOW.PROPREFS, PROP_REFs_ADB, XRC )
```

```
(*****  
(* KEYBLOCK DECLARATIONS *)  
*****)
```

```
TYPE
```

```
KEYBLOCK = RECORD
  CASE INTEGER OF
    K_ARRAY_ENTITY    : (ARRAY_ENTITY      : P_ARRAY_ENTITY    );
    K_AIRFLOW         : (AIRFLOW           : P_AIRFLOW         );
    K_RB_SPLINE2      : (RB_SPLINE2       : P_RB_SPLINE2      );
  END;
```

5.3 PHYSICAL SUBSCHEMA REPORT

The Physical Subschema Report (PSR) displays all of the entity definitions in a particular physicalized subschema. The PSR contains information similar to that contained in the Data Dictionary. The following qualities are unique to the Physical Subschema Report:

- o Provides indices organized by entity name and kind number.
- o Is presented in a human readable form, more than the Data Dictionary.
- o Excludes class information.
- o Excludes any minimum occurrence information.

The format of the PSR contains the nine elements listed below. These elements are represented with the appropriate reference number in Figure 5-15.

- (1) Entity name and kind number.
- (2) Application Data Block information:
 - (a) Attribute name
 - (b) Attribute type
 - (c) Attribute conceptual schema order (position)
 - (d) Attribute physical schema order (position)
 - (e) Size of ADB attribute
 - (f) ADB displacement or constituent list position
 - (g) Total number and names of enumeration values (for enumeration attributes)
 - (h) Total number and names of constituent reference entity kinds (for pointer attributes)
 - (i) Total number of dimensions, the array low bounds, and the array high bounds (for array attributes)

UM560130002
22 December 1987

```

** PAGE 1*****
```

```

** ENTITY-NAME: RB_SPLINE2      (1)
      KIND: 225
```

```

** APPLICATION DATA BLOCK      (2)
```

ATTRIBUTE- NAME (a)	TYPE (b)	CS- ORDER (c)	PS- ORDER (d)	ADB- SIZE (e)	DISP (f)
KIND	INTEGER	1	1	4	0
LENGTH	INTEGER	2	2	4	4
SYSUSE	INTEGER	3	3	4	8
IDENT	INTEGER	4	4	4	12
CRV_IND	ENUMERATION	5	10	1	2022
		(g)	#-OF-VAL:	6,	VALUES : UNDETERMINED
					LINEAR_ARC
					CIRCULAR_ARC
					ELLIPTICAL_ARC
					PARABOLIC_ARC
					HYPERBOLIC_ARC
DEGREE	INTEGER	6	7	2	2016
KNOTS	ARRAY OF REAL	7	5	8	16
			(h)	#-OF-DIM:	1, LOW-BND: 1, UPR-BND:125
NO_KNOTS	INTEGER	8		2	2018
PERIODIC	LOGICAL	9	11	1	2023
WEIGHTS	ARRAY OF REAL	10	6	8	1016
			(i)	#-OF-DIM:	1, LOW-BND: 1, UPR-BND:125
NO_WEIGHTS	INTEGER	11	9	2	2020

```

** CONSTITUENT LIST
```

ATTRIBUTE- NAME	TYPE	CS- ORDER	CL_POS	ELIG #	ELIG	KIND
CTRL PTS	ARRAY OF POINTER	12	1	1	243	
				#-OF-DIM:	1, LOW-BND: 1, UPR-BND:125 1	

Figure 5-15 Physical Subschema Report, Example 1

UM560130002
22 December 1987

** PAGE 2 **

** ENTITY-NAME: AIRFLOW
KIND: 938

** APPLICATION DATA BLOCK

ATTRIBUTE- NAME	TYPE	CS- ORDER	PS- ORDER	SIZE	ADB- DISP
KIND	INTEGER	1	1	4	0
LENGTH	INTEGER	2	2	4	4
SYSUSE	INTEGER	3	3	4	8
IDENT	INTEGER	4	4	4	12
APPLICATION	ENUMERATION	5	8	1	40

#-OF-VAL: 7, VALUES :REQUIRED
OPTIONL
UOS
GLOBL
EXCEPTION
ALTERNATIVE
INFORMATION

AIRFLOW_KIND	ENUMERATION	8	9	1	41
				#-OF-VAL: 2, VALUES : FULL PARTIAL	
MAX_PRES_RATIO	REAL	9	5	8	16
MIN_PRES_RATIO	REAL	10	6	8	24
AIRFLOW_PARM	REAL	11	7	8	32

** CONSTITUENT LIST

ATTRIBUTE- NAME	TYPE	CS- ORDER	CL_POS	ELIG #	KIND
PROP_REFs	ARRAY OF POINTER	6	1	1 199	
				#-OF-DIM: 1, LOW-BND: 1, UPR-BND: 255	
INSP_CONTROLS	ARRAY OF POINTER	7	2	1 931	
				#-OF-DIM: 1, LOW-BND: 1, UPR-BND: 10	
BLOCKS	ARRAY OF POINTER	12	3	1 939	
				#-OF-DIM: 1, LOW-BND: 1, UPR-BND: 255	

Figure 5-16 Physical Subschema Report, Example 2

UM560130002
22 December 1987

Figure 5-17 illustrates two indices provided by the PSR, one in order of entity kind and the other in alphabetical order. All of the entities are listed in order of entity kind and in alphabetical order. The name and kind number are followed by the page number for the entity definition. The Physical Subschema Report (PSR) shows all of the entity physical definitions for a specified subschema.

** TABLE OF CONTENTS ** (IN ORDER OF ENTITY KIND)		
KIND	ENTITY-NAME	PAGE
(225)	RB_SPLINE2	----- 1
(938)	AIRFLOW	----- 2

** TABLE OF CONTENTS ** (IN ORDER OF ENTITY NAME)		
ENTITY NAME	KIND	PAGE
AIRFLOW	(938)	----- 2
RB_SPLINE2	(225)	----- 1

Figure 5-17 Physical Subschema Report, Indices

5.4 PDDI/GMAP DATA DICTIONARY

The data dictionary is composed of two files:

- Index file
- Definition file

Index file example:

1100,ARRAY_ENTITY	,	2, 11,E
225,RB_SPLINE2	,	213, 19,E
938,AIRFLOW	,	2560, 22,E
222,OPEN_CURVE2	,	2867, 6,C
974,INSP_TECHNIQUE	,	3288, 9,C

One possible record format exists in the data dictionary index file:

Col. 1- 5 : Kind number (5 digits)
Col. 7-22 : Entity or class name (16 characters)
Col. 40-45 : Position of first definition record (6 digits)
Col. 47-49 : Number of records in definition (3 digits)
Col. 51 : 'E' for entity or 'C' for class

The data dictionary index file in order by kind number.

Definition file example:

```
#####1#####2#####3#####4#####5#####6#####7#####8
ARRAY_ENTITY , 1100, 5
  KIND , 1, 1, 1, 0,1, 4, 0
  LENGTH , 2, 2, 1, 0,1, 4, 4
  SYSUSE , 3, 3, 1, 0,1, 4, 8
  IDENT , 4, 4, 1, 0,1, 4, 12
  CL_ENTITIES , 5, 0, 1, 1,7, 4, 1
X47, 101, 102, 106, 107, 108, 109, 118, 199, 210, 212, 245, 310
X47, 312, 321, 322, 330, 333, 343, 344, 345, 350, 360, 400, 401
X47, 406, 416, 420, 440, 450, 470, 510, 517, 529, 569, 630, 640
X47, 700, 701, 710, 717, 722, 744, 759, 900, 922, 930, 952
A 1,254
#####1#####2#####3#####4#####5#####6#####7#####8
RB_SPLINE2 , 225,12
  KIND , 1, 1, 1, 0,1, 4, 0
  LENGTH , 2, 2, 1, 0,1, 4, 4
  SYSUSE , 3, 3, 1, 0,1, 4, 8
  IDENT , 4, 4, 1, 0,1, 4, 12
  CRV_IND , 5,10, 1, 0,5, 1, 2022
X 6,UNDETERMINED ,LINEAR_ARC ,CIRCULAR_ARC ,ELLIPTICAL_ARC
X 6,PARABOLIC_ARC ,HYPERBOLIC_ARC
  DEGREE , 6, 7, 1, 0,1, 2, 2016
  KNOTS , 7, 5, 2, 1,2, 8, 16
A 1,125
  NO_KNOTS , 8, 8, 1, 0,1, 2, 2018
  PERIODIC , 9,11, 1, 0,4, 1, 2023
  WEIGHTS ,10, 6, 2, 1,2, 8, 1016
A 1,125

  NO_WEIGHTS ,11, 9, 1, 0,1, 2, 2020
  CTRL PTS ,12, 0, 2, 1,7, 4, 1
X 1, 245
A 1,125
```

#####1#####2#####3#####4#####5#####6#####7#####8
AIRFLOW , 938,12
KIND , 1, 1, 1, 0,1, 4, 0
LENGTH , 2, 2, 1, 0,1, 4, 4
SYSUSE , 3, 3, 1, 0,1, 4, 8
IDENT , 4, 4, 1, 0,1, 4, 12
APPLICATION , 5, 8, 1, 0,5, 1, 40
X 7, REQUIRED ,OPTIONL ,UOS ,GLOBL
X 7, EXCEPTION ,ALTERNATIVE ,INFORMATION
PROP_REFS , 6, 0, 0, 1,7, 4, 1
X 1, 199
A 1,255
INSP_CONTROLS , 7, 0, 1, 1,7, 4, 2
X 1, 931
A 1, 10
AIRFLOW_KIND , 8, 9, 1, 0,5, 1, 41
X 2, FULL ,PARTIAL
MAX_PRES_RATIO , 9, 5, 1, 0,2, 8, 16
MIN_PRES_RATIO , 10, 6, 1, 0,2, 8, 24
AIRFLOW_PARM , 11, 7, 1, 0,2, 8, 32
BLOCKS , 12, 0, 0, 1,7, 4, 3
X 1, 939
A 1,255
#####1#####2#####3#####4#####5#####6#####7#####8
OPEN_CURVE2 , 222, 5
227 , 1, 0, 0, 0,0, 0, 0
228 , 2, 0, 0, 0,0, 0, 0
226 , 3, 0, 0, 0,0, 0, 0
229 , 4, 0, 0, 0,0, 0, 0
225 , 5, 0, 0, 0,0, 0, 0
#####1#####2#####3#####4#####5#####6#####7#####8
INSP_TECHNIQUE , 974, 8
938 , 1, 0, 0, 0,0, 0, 0
933 , 2, 0, 0, 0,0, 0, 0
942 , 3, 0, 0, 0,0, 0, 0
936 , 4, 0, 0, 0,0, 0, 0
937 , 5, 0, 0, 0,0, 0, 0
934 , 6, 0, 0, 0,0, 0, 0
941 , 7, 0, 0, 0,0, 0, 0
935 , 8, 0, 0, 0,0, 0, 0

Six possible record formats exist in the data dictionary definition file:

1) Entity or Class name record (first record of definition):

Col. 1 : ''
Col. 2-17 : Entity or class name (16 characters)
Col. 19-23 : Kind number (5 digits)
Col. 25-26 : Number of attributes or class members (2 digits)
(Note: Not necessarily the same as the number of records in the definition.)

Example:

```
#####1#####2#####3#####4#####5#####6#####7#####8
AIRFLOW , 938,12
```

2) Attribute definition record (entity definition):

Col. 1 : ''
Col. 2-17 : Attribute name (16 characters)
Col. 19-20 : Conceptual schema order (2 digits)
Col. 22-23 : Physical schema order (2 digits)
Col. 25-27 : Minimum occurrences (3 digits)
(Note: 0 for optional attributes, as specified for the list and data types, 1 otherwise)
Col. 29-30 : Number of array dimensions (2 digits)
Col. 32 : Attribute data type (1 digit)
(Note: Integer = 1, Real = 2, String = 3, Logical = 4, Enumeration = 5, and Constituent reference = 7)
Col. 34-36 : Size of ADB field (3 digits)
Col. 38-43 : ADB displacement or CL position (6 digits)

Example:

```
#####1#####2#####3#####4#####5#####6#####7#####8
APPLICATION , 5, 8, 1, 0,5, 1, 40
```

3) Enumeration attribute continuation record (data type = 5):

Col. 1 : 'X' (continuation flag)
Col. 2- 3 : Number of values (2 digits)
Col. 5-20 : Enumeration values (16 characters)
(Note: Enumeration values are repeated, as many as 4 per record: cols. 22-37, 39-54, 56-71. Succeeding records, if required, repeat this format)

Example:

```
#####1#####2#####3#####4#####5#####6#####7#####8
X 7,REQUIRED ,OPTIONL ,UOS ,GLOBL
```

4) Constituent reference attribute continuation record (data type = 7):

Col. 1 : 'X' (continuation flag)
Col. 2- 3 : Number of entity kinds (2 digits)
Col. 5- 9 : Entity Kind (5 digits)
(Note: Entity kinds are repeated, as many as 12 per record: 11-15 ... 71-75. Succeeding records, if required, repeat this format)

Example:

```
#####1#####2#####3#####4#####5#####6#####7#####8
X 1, 199
```

5) Array bounds record:

Col. 1 : 'A' (array bounds flag)
Col. 2- 4 : Low bound of array dimension (3 digits)
Col. 6- 8 : High bound of array dimension (3 digits)
(Note: Pairs of low and high bound are repeated for multidimensional arrays, as many as 10 dimensions per record: 10-12, 14-16 ... 74-76, 78-80. Succeeding records, if required, repeat this format.)

Example:

```
#####1#####2#####3#####4#####5#####6#####7#####8
A 1,255
```

UM560130002
22 December 1987

6) Membership record (class definition):

Col. 1 : ''
Col. 2- 6 : Kind number (5 characters)
Example:

```
#####1#####2#####3#####4#####5#####6#####7#####8
227      , 1, 0, 0, 0, 0
```

SECTION 6

BATCH INTERFACE

The function of Batch Interface can create a new schema or add to an existing schema. In order to update or review a schema, the interactive Schema Manager must be used.

6.1 KEYWORDS

To add to an existing file, the keyword RETRIEVE must precede all declarations. RETRIEVE prompts the Batch Interface to retrieve an existing file.

Reports can also generated through the Batch Interface. The keyword REPORT accesses this capability as illustrated in Table 6-1.

Table 6-1
Accessing REPORT features through Batch Interface

REPORT CSR	Generates a Conceptual Schema Report.
REPORT PIF gmap	Generates a Pascal Include File for the GMAP subschema.
REPORT RTS gmap	Generates a Run-Time Subschema Data File and Index File for the GMAP subschema.
REPORT DD gmap	Generates a Data Dictionary Data File and Index File for the GMAP subschema.
REPORT PSR gmap	Generates a Physical Subschema Report for the GMAP subschema.

The schema is automatically filed when the end-of-file is encountered and no errors, warnings, or unresolved references exist.

Keywords available in the Batch Interface function of the Schema Manager include: array, class, entity, enumeration, global, integer, list, logical, of, option, pointer, real, schema/subschema, set, string, subtype, supertype, to, and type. Table 6-2 lists each keyword along with a description of each.

Table 6-2
Batch Interface Keywords

KEYWORD	DESCRIPTION
ARRAY	<p>A built-in type which defines the characteristics of an unordered, homogeneous collection which has a fixed size.</p> <p><u>Example:</u></p> <pre>a : ARRAY(1:4) of real; b : ARRAY(1 to 3) of ARRAY(1 to 4) of real;</pre>
CLASS	<p>Starts a class definition block. The block must be terminated by an END_CLASS statement.</p> <p><u>Example:</u></p> <pre>CLASS ClassName (KindNumber); -- body of class end_class;</pre> <p>The body of the class block may contain any combination of the following: entity blocks, entity identifiers, class blocks, or class identifiers.</p> <pre>END_CLASS END_ENTITY END_SCHEMA END_SUBSCHEMA END_SUPERTYPE</pre> <p>Blocks are terminated by explicit end keywords, e.g., an entity block is terminated by END_ENTITY.</p>

Table 6-2 (Continued)
Batch Interface Keywords

KEYWORD	DESCRIPTION
ENTITY	<p>Starts the declaration of an entity. Entity declarations follow the form:</p> <pre>ENTITY EntityName (KindNumber); AttributeName1 : TypeDefinition; AttributeName2 : TypeDefinition; end_entity;</pre> <p>TypeDefinition must be a defined entity, or one of the built-in entities such as INTEGER, STRING, ARRAY, etc.</p>
ENUMERATION	<p>A type which allows names to be given to an ordered collection of integer values. An enumeration may not be defined directly as an attribute of an entity. It must first be defined as a defined type.</p> <p><u>Example:</u></p> <pre>type color = ENUMERATION OF (red, blue, green);</pre>
GLOBAL	<p>Starts the declaration of a global attribute.</p> <p><u>Example:</u></p> <pre>GLOBAL ident : integer;</pre>
INTEGER	<p>A built-in type which defines the qualities of a whole decimal number.</p> <p><u>Example:</u></p> <pre>b : INTEGER(7);</pre>

Table 6-2 (Continued)
Batch Interface Keywords

KEYWORD	DESCRIPTION
LIST	<p>A built-in type which defines the characteristics of an ordered, homogeneous collection which has an adjustable size.</p> <p><u>Example:</u></p> <p>control : LIST(2 : 5) of real;</p>
LOGICAL	<p>A built-in type which describes the attribute to be binary valued.</p> <p><u>Example:</u></p> <p>c : logical;</p>
OF	<p>Used following the keywords ARRAY, ENUMERATION, LIST, and SET to improve readability.</p>
OPTIONAL	<p>Attribute modifier which stipulates that a value for an attribute may or may not be present. This does not mean that the attribute is optional, but that the value is optional.</p> <p><u>Example:</u></p> <pre>entity point (12345); x,y : real; z : OPTIONAL real; end_entity;</pre>
POINTER	<p>A reference to another entity.</p> <p><u>Example:</u></p> <p>d : POINTER to (ClassName, EntityNumber, EntityName, ClassNumber);</p>

Table 6-2 (Continued)
Batch Interface Keywords

KEYWORD	DESCRIPTION
REAL	<p>A built-in type which describes the characteristics of a floating point decimal number.</p> <p><u>Example:</u></p> <p>x : REAL(14); .</p>
SCHEMA SUBSCHEMA	<p>Starts a subschema definition block. The block must be terminated by an END_SCHEMA or END_SUBSCHEMA statement.</p> <p><u>Example:</u></p> <pre>SUBSCHEMA SubschemaName; -- body of subschema end_subschema;</pre> <p>The body of the subschema block may contain any combination of the following: entity blocks, entity identifiers, class blocks, or class identifiers.</p>
SET	<p>A built-in type which defines the characteristics of an unordered, homogeneous collection which has an adjustable size.</p> <p><u>Example:</u></p> <p>member : SET(1:5) of integer;</p>
STRING	<p>A built-in type which defines the characteristics of a string of characters.</p> <p><u>Example:</u></p> <p>name : STRING(24);</p>

Table 6-2 (Continued)
Batch Interface Keywords

KEYWORD	DESCRIPTION
SUBTYPE	<p>An optional part of an entity declaration which states that the entity is a subtype of the supertype listed.</p> <p><u>Example:</u></p> <pre>supertype geometry; a : real; end_supertype; entity point SUBTYPE of (geometry); AttributeName : TypeDefinition; end_entity;</pre>
SUPERTYPE	<p>Defines a group of attributes that can be inherited through a subtype reference.</p> <p><u>Example:</u></p> <pre>SUPERTYPE geometry; a : real; end_supertype;</pre>
TO	<p>Can be used in place of a colon in ARRAY, LIST, and SET declarations.</p>
TYPE	<p>An alias for a primitive, complex primitive, or aggregation data type.</p> <p><u>Example:</u></p> <pre>TYPE string80 = string(80);</pre>

6.2 EXAMPLE BATCH INPUT FILE

An example batch input file is illustrated below:

```
SUBSCHEMA example;      (* an example *)

  TYPE integer8 = INTEGER(8);
  real8 = REAL 8;
  string16 = STRING (16);
  log = LOGICAL;
  array16 = ARRAY (1 to 16) OF POINTER(entity_one);
  enum = ENUMERATION OF (red, white, blue);

  GLOBAL ident : INTEGER;

  SUPERTYPE collector;
    supertype_field : INTEGER;
  END_SUPERTYPE;

  ENTITY entity_one (11111);
    field_one : log;
    field_two : POINTER(entity_two);
    field_three : enum;
  END_ENTITY;

  ENTITY entity_two (22222) SUBTYPE OF (collector);
    field_one : array16;
    field_two : integer8;
    field_three : real8;
    field_four : string16;
  END_ENTITY;

  CLASS class_one 12345;
    22222;
    entity_one;
  END_CLASS;

END_SCHEMA;

REPORT CONCEPTUAL      -- generate the Conceptual Schema Report
REPORT PASCAL example  -- generate the Pascal Include File
```

SECTION 7
INTRODUCTION

The Model Query Utility (MQU) allows the verification of a working form model in batch or by interaction. Upon entry into the MQU program, the MODEL QUERY MAIN MENU is displayed. This main menu lists an option to verify a working form model in batch or by interaction. The MODEL QUERY MAIN MENU is illustrated in Figure 7-1.

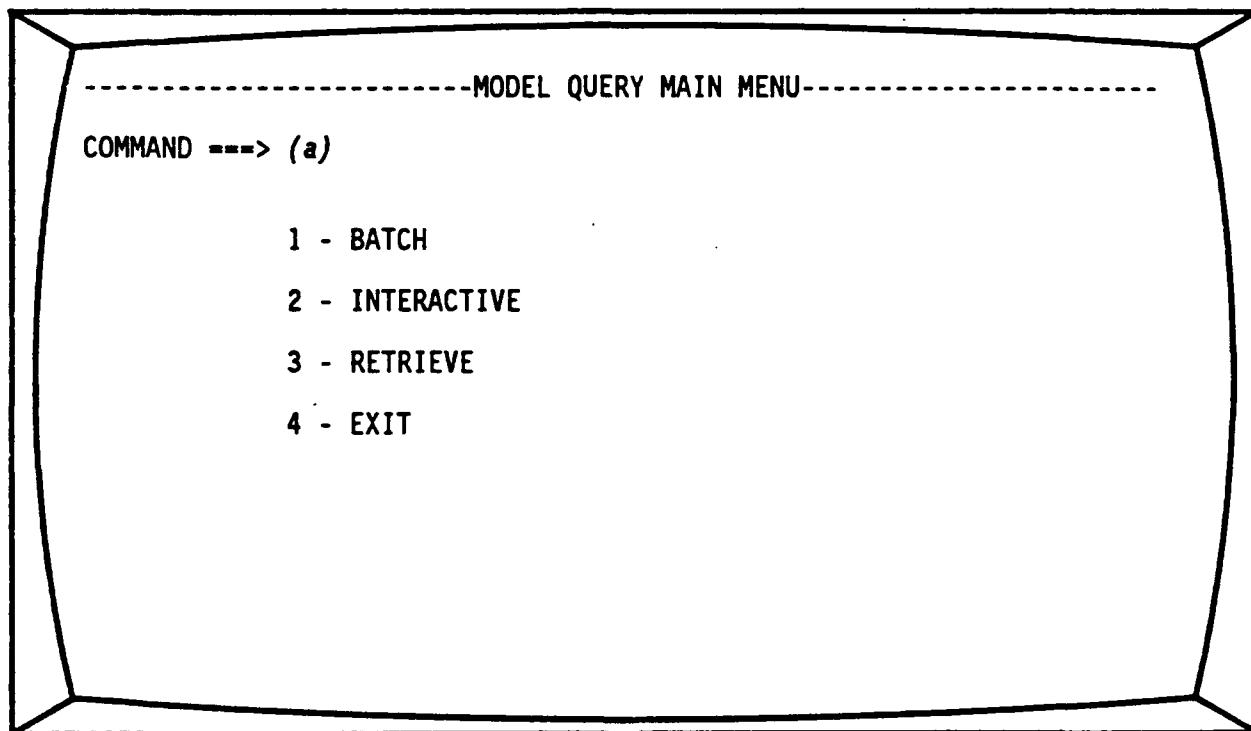


Figure 7-1 Model Query Main Menu

Menu Description:

(a) Select option 1 to display the MODEL QUERY BATCH MENU.
Select option 2 to display the MODEL QUERY INTERACTIVE MENU.
Select option 3 to display the DATASET MENUS to restore a model from a file to working form and the data dictionary.
Select option 4 to exit from the Model Query Utility.

7.1 BATCH

The screen illustrated in Figure 7-2 is displayed when command 1, Batch, is selected from the MODEL QUERY MAIN MENU.

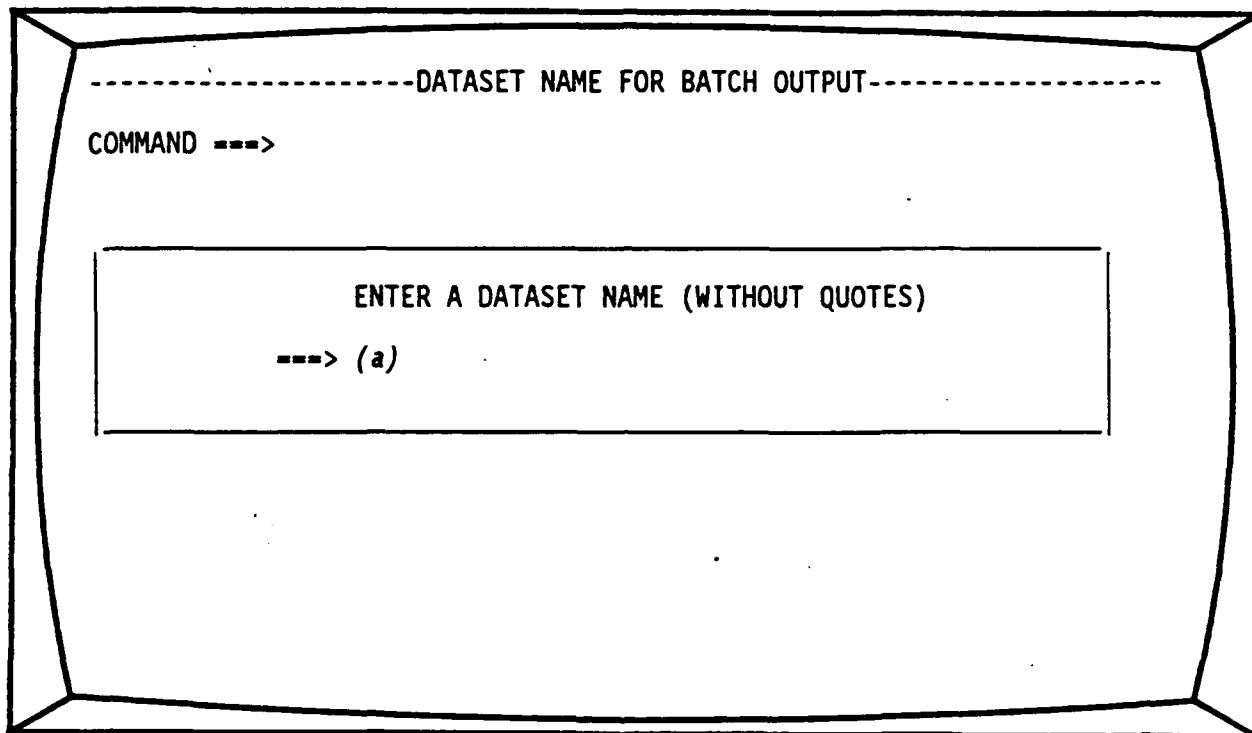


Figure 7-2 Dataset Name For Batch Output

Menu Description:

- (a) Enter a dataset name for the batch output.
The MODEL QUERY BATCH MENU will be displayed.

The Model Query Batch Menu, a submenu of the Batch Function, is illustrated in Figure 7-3.

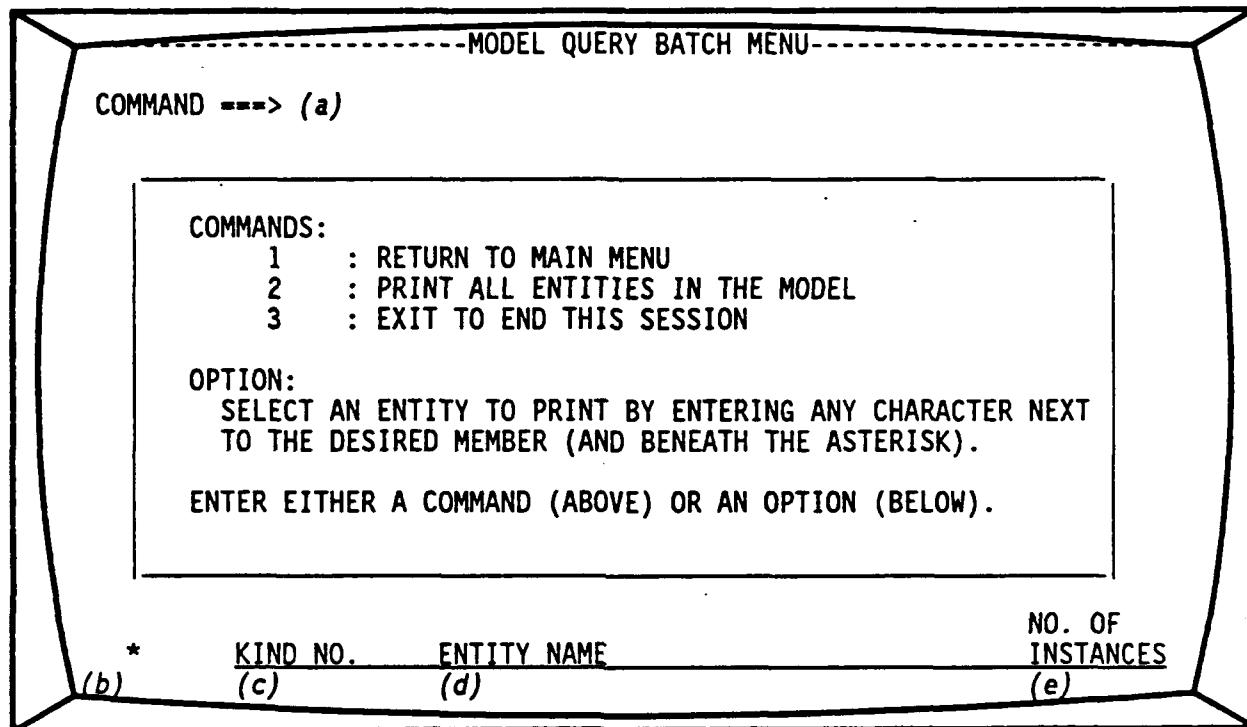


Figure 7-3 Model Query Batch Menu

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to print all entities in the model.
Select option 3 to exit from the Model Query Utility.
- (b) Select an entity by entering any character next to an entity.
Either the BATCH ENTITY MENU will be displayed or the NO ENTITY FOUND menu will be displayed.
- (c) The entity KIND number is displayed.
- (d) The entity NAME is displayed.
- (e) The total number of instances is displayed.

The Batch Entity Menu, a submenu of the Batch Function, is illustrated in Figure 7-4.

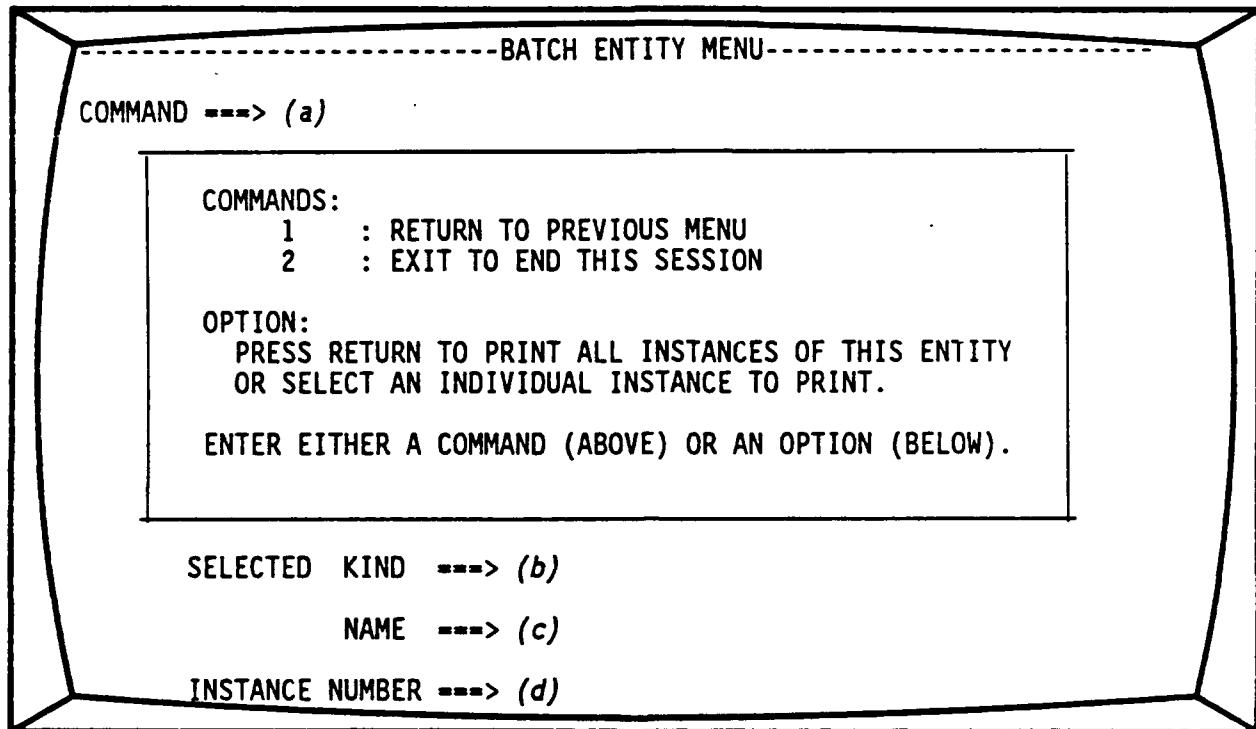


Figure 7-4 Batch Entity Menu

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to exit from the Model Query Utility.
- (b) The selected entity kind number is displayed.
- (c) The selected entity name is displayed.
- (d) Press ENTER to print all instances of defined entity or select an individual instance of defined entity to print.

The **No Entity Found** screen, a subscreen of the Batch Function, is illustrated in Figure 7-5.

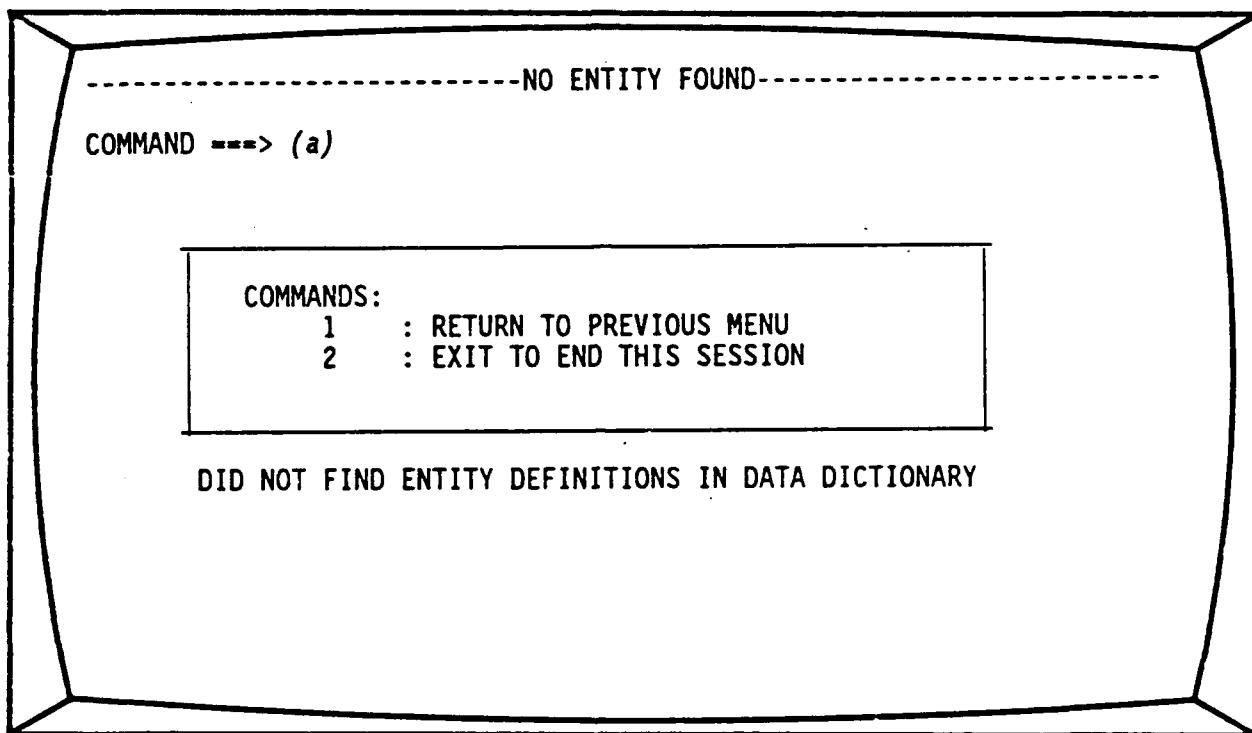


Figure 7-5 No Entity Found

Menu Description:

(a) Select option 1 to redisplay the previous menu.
Select option 2 to exit from the Model Query Utility.

7.2 INTERFACE

The screen illustrated in Figure 7-6 is displayed when command 2, Interactive, is selected from the MODEL QUERY MAIN MENU.

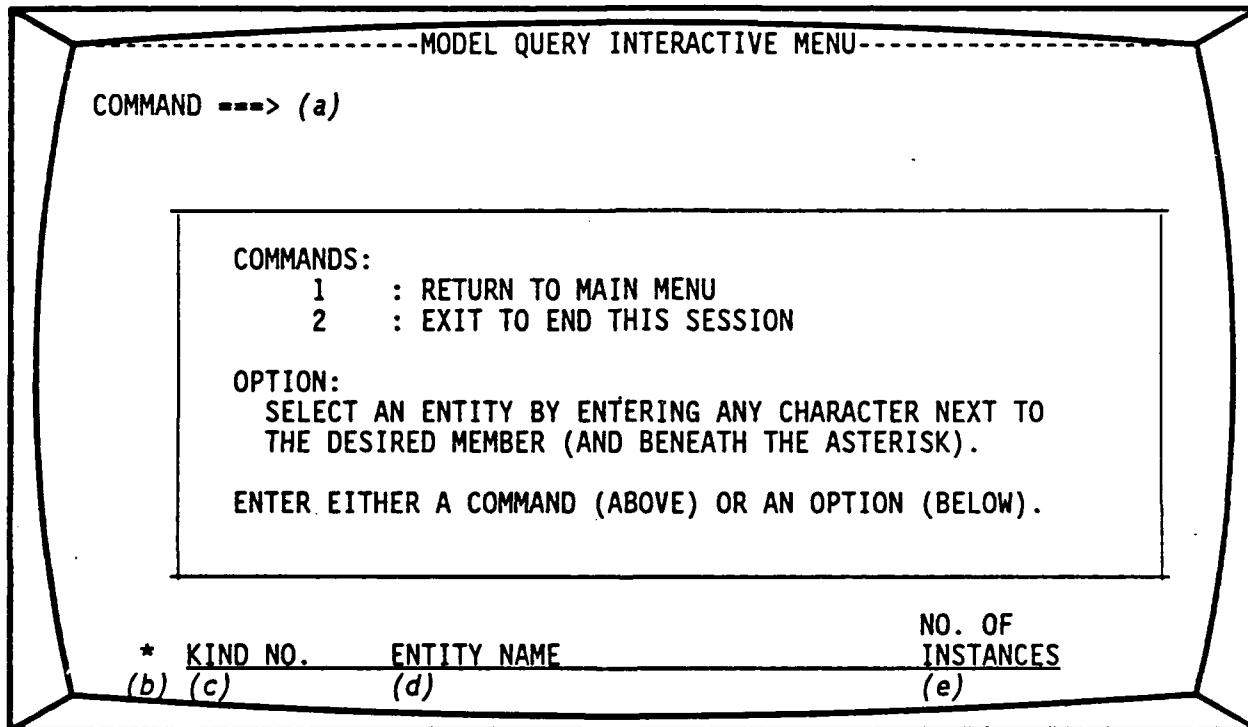


Figure 7-6 Model Query Interactive Menu

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to exit from the Model Query Utility.
- (b) Select an entity by entering any character next to an entity.
Either the INTERACTIVE ENTITY MENU will be displayed or the NO ENTITY FOUND menu will be displayed.
- (c) The entity KIND number is displayed.
- (d) The entity NAME is displayed.
- (e) The total number of instances is displayed.

The **Interactive Entity Menu**, a submenu of the **Interactive Function**, is illustrated in Figure 7-7.

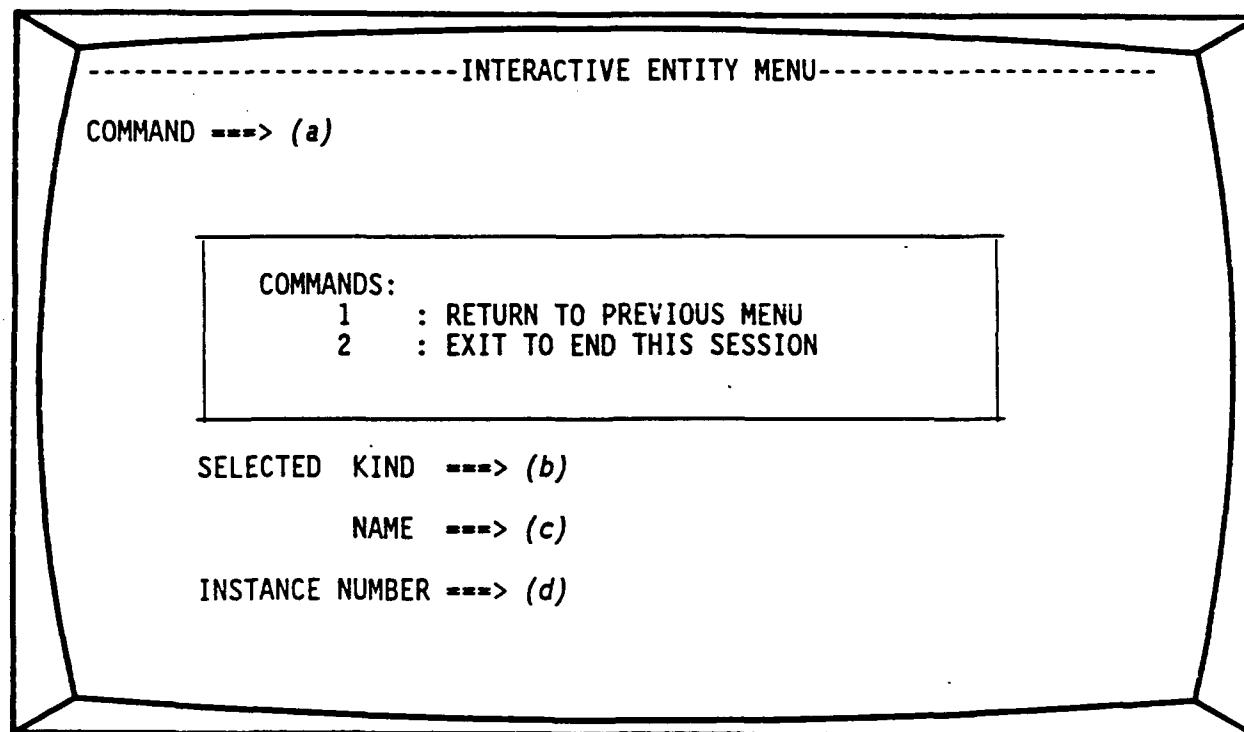


Figure 7-7 Interactive Entity Menu

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to exit from the Model Query Utility.
- (b) The selected entity kind number is displayed.
- (c) The selected entity name is displayed.
- (d) Enter an instance number ranging from 1 to number of instances in the selected entity.
The DISPLAY ATTRIBUTES menu will be displayed.

The **Display Attributes**, a submenu of the Interactive Function, is illustrated in Figure 7-8.

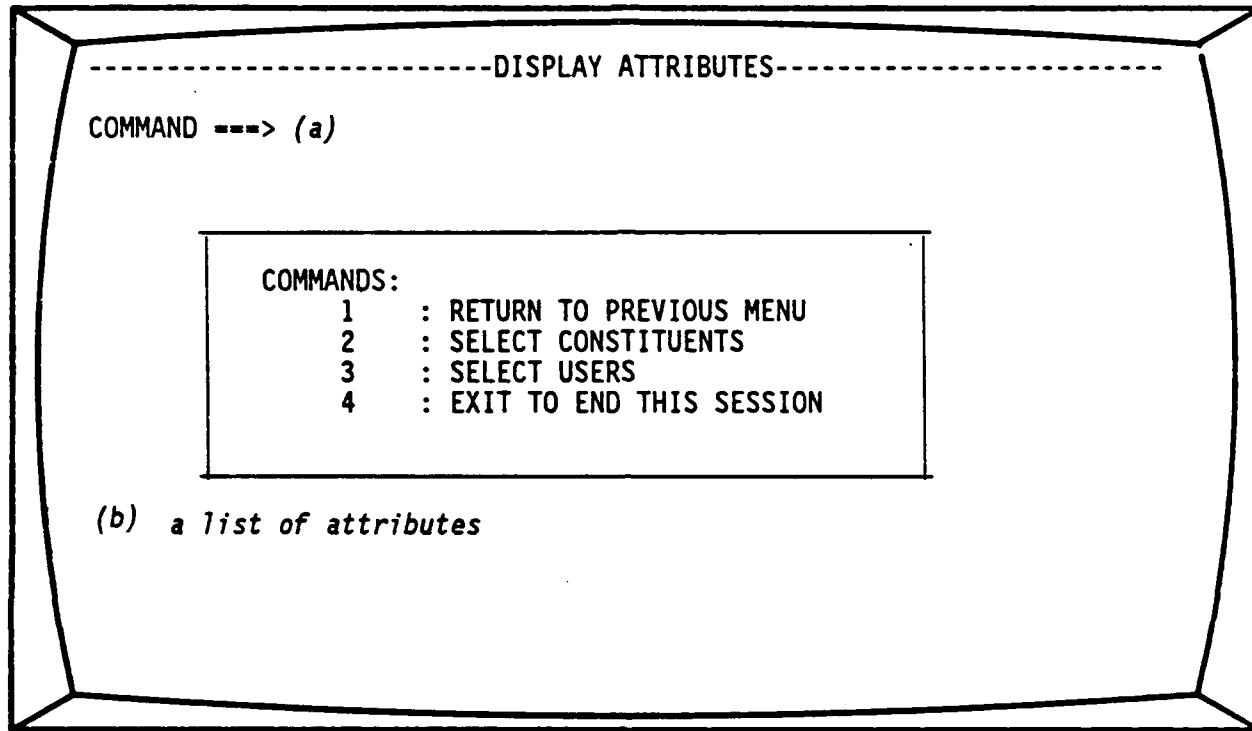


Figure 7-8 Display Attributes

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to display the SELECT CONSTITUENT MENU or the NO CONSTITUENTS menu.
Select option 3 to display the SELECT USER MENU or the NO USERS menu.
Select option 4 to exit from the Model Query Utility.
- (b) The attribute name and its value are displayed.

The Select Constituent screen, a subscreen of the Interactive Function, is illustrated in Figure 7-9.

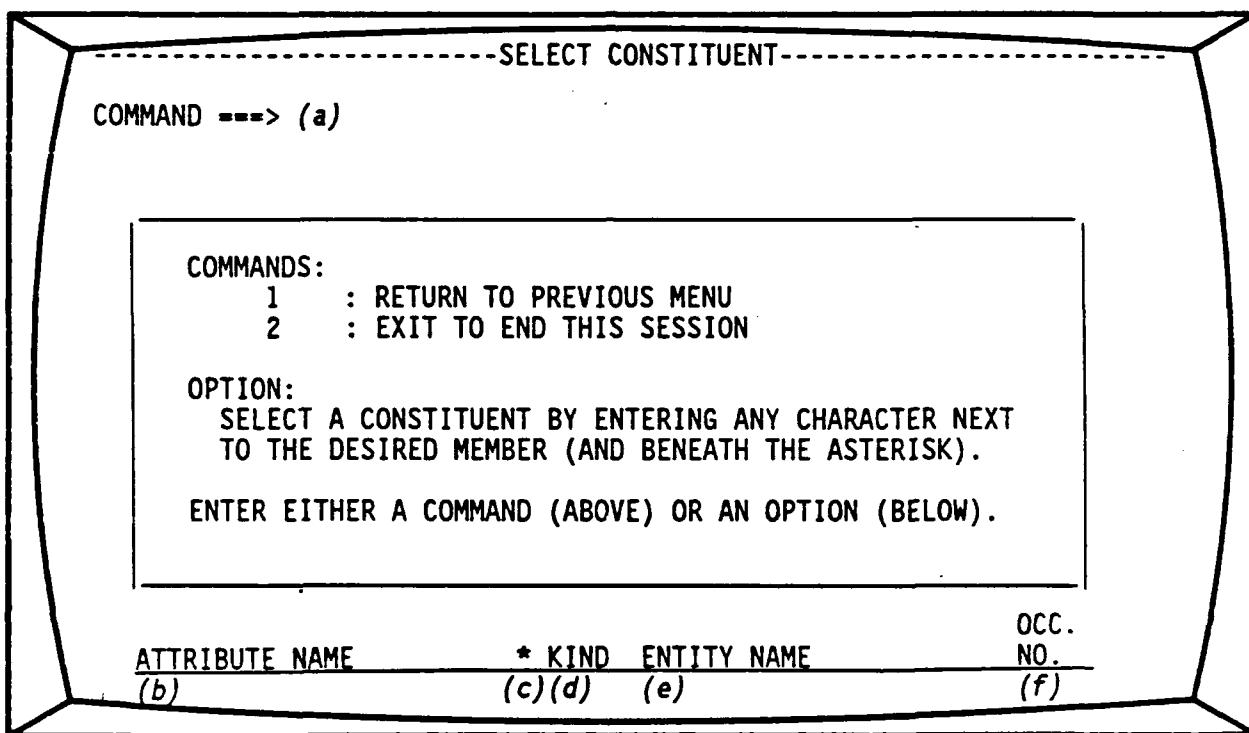


Figure 7-9 Select Constituent

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to exit from the Model Query Utility.
- (b) The attribute name is displayed.
- (c) Select a constituent entity by entering any character next to a member.
- (d) The constituent kind number is displayed.
- (e) The constituent entity name is displayed.
- (f) The occurrence number of instance is displayed.

UM560130002
22 December 1987

The **No Constituents** screen, a subscreen of the Interactive Function, is illustrated in Figure 7-10.

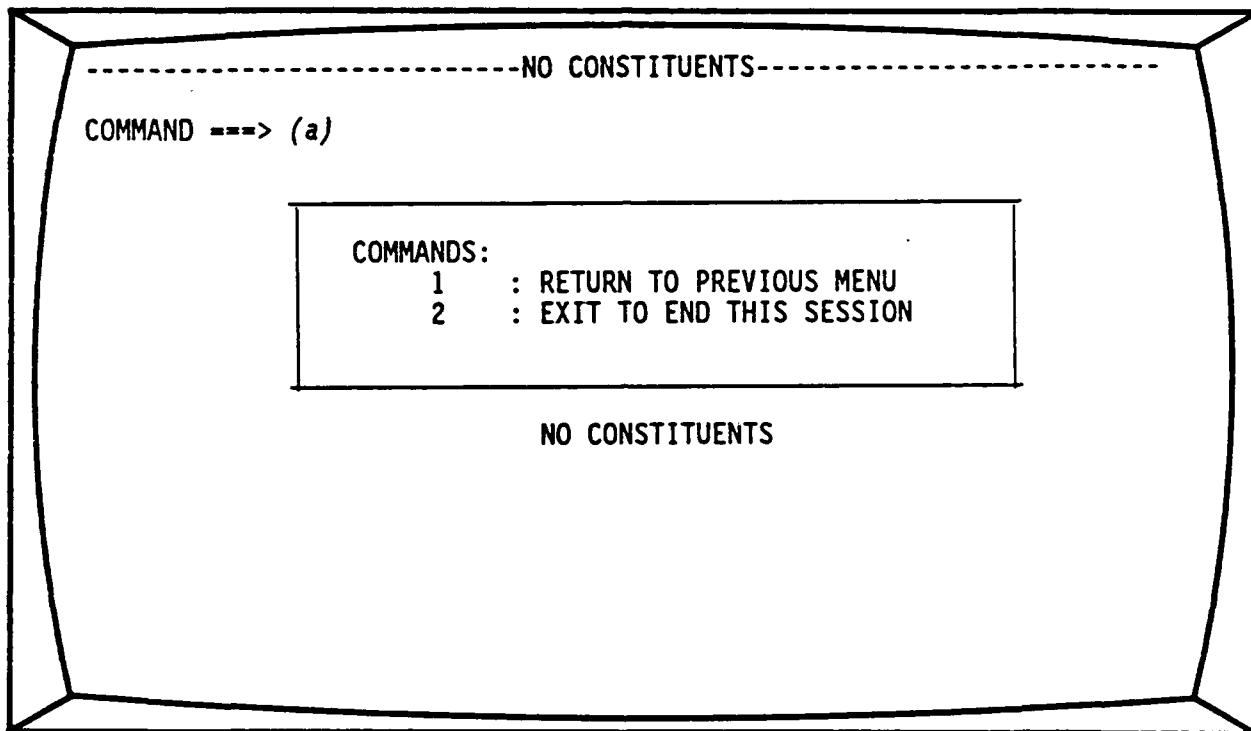


Figure 7-10 No Constituents

Menu Description:

(a) Select option 1 to redisplay the previous menu.
Select option 2 to exit from the Model Query Utility.

The Select User screen, a subscreen of the Interactive Function, is illustrated in Figure 7-11.

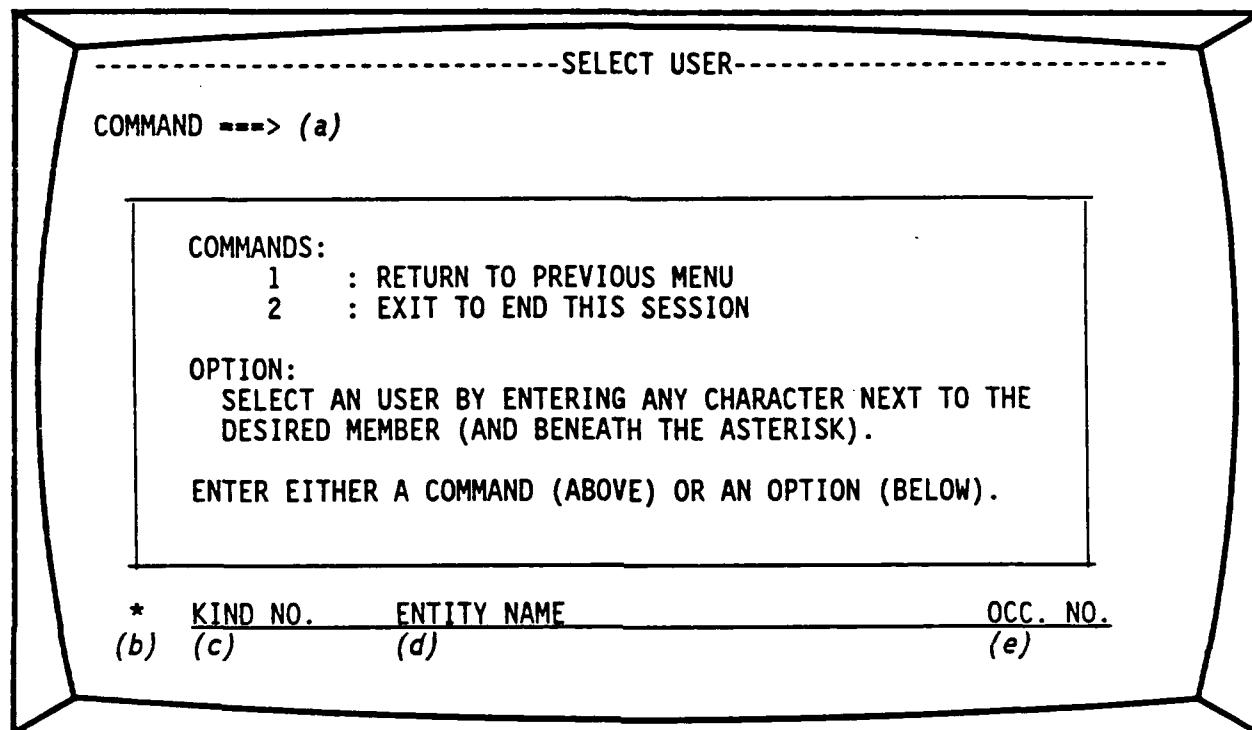


Figure 7-11 Select User

Menu Description:

- (a) Select option 1 to redisplay the previous menu.
Select option 2 to exit from the Model Query Utility.
- (b) Select an user by entering any character next to a member.
- (c) The user kind number is displayed.
- (d) The user entity name is displayed.
- (e) The occurrence number of instance is displayed.

The No Users screen, a subscreen of the Interactive Function, is illustrated in Figure 7-12.

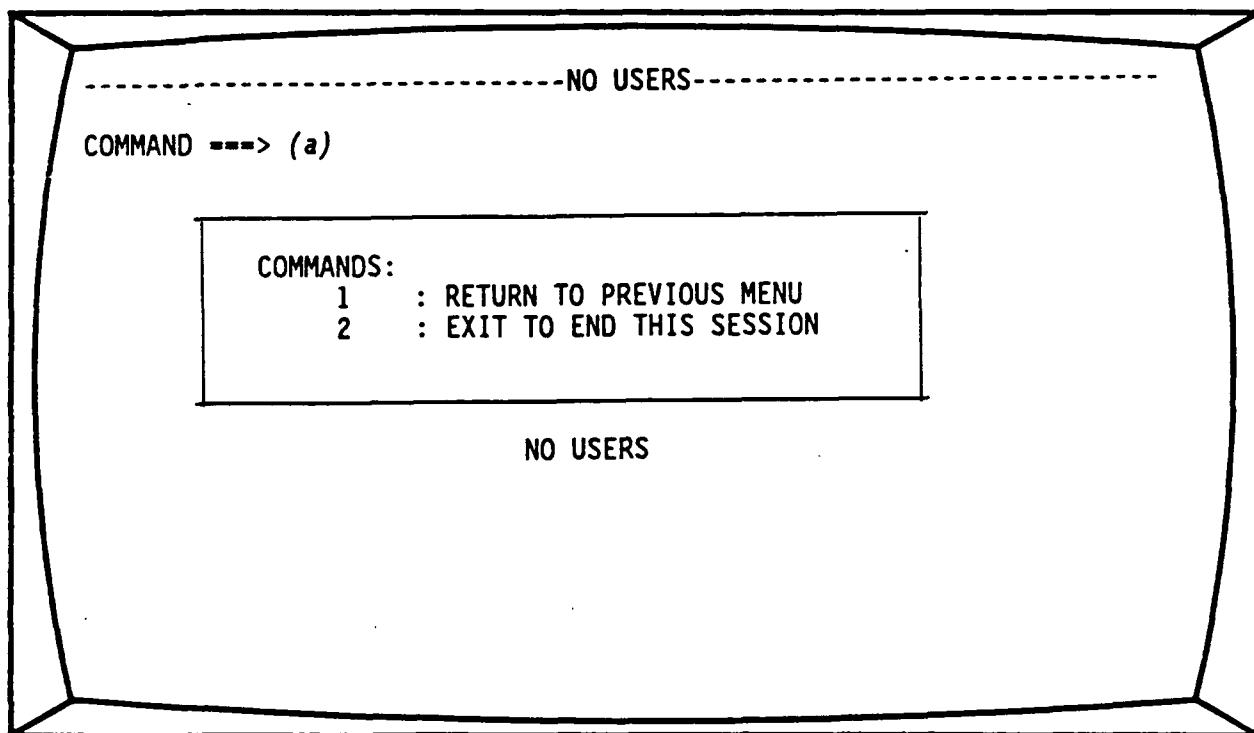


Figure 7-12 No Users

Menu Description:

(a) Select option 1 to redisplay the previous menu.
Select option 2 to exit from the Model Query Utility.

UM560130002
22 December 1987

The No Entity Found screen, a subscreen of the Interactive Function, is illustrated in Figure 7-13.

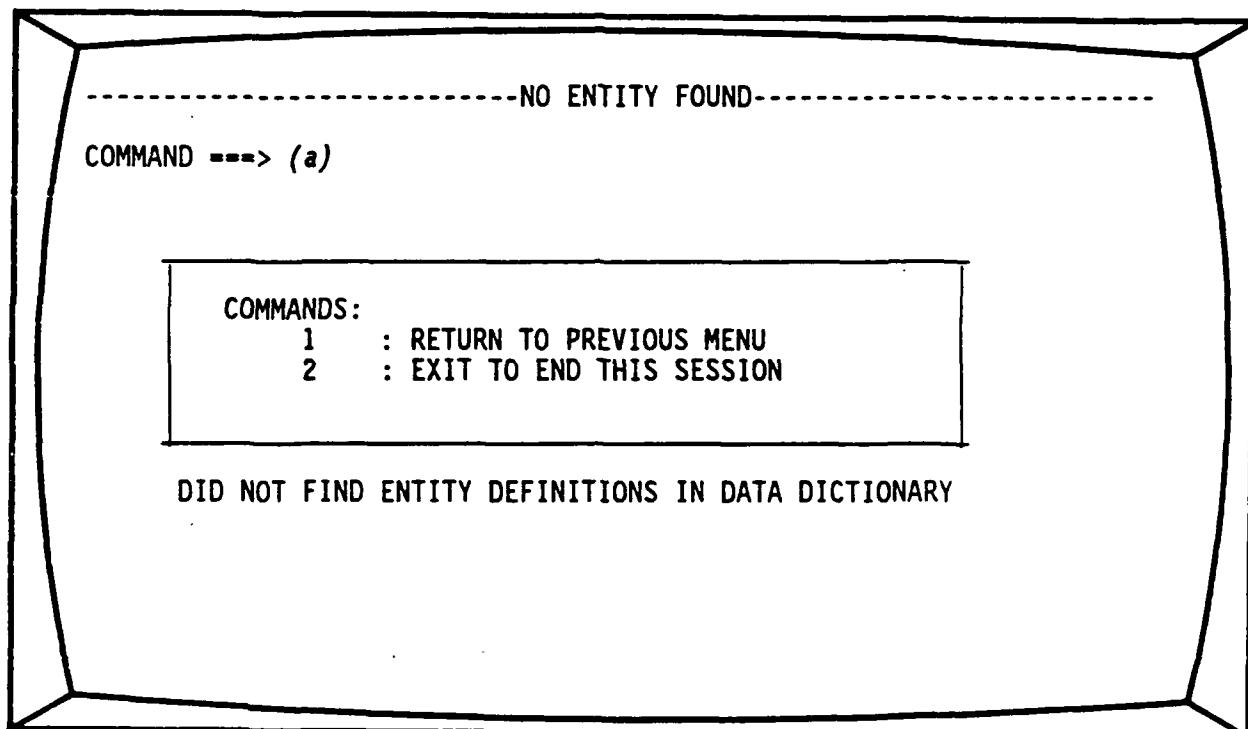


Figure 7-13 No Entity Found

Menu Description:

(a) Select option 1 to redisplay the previous menu.
Select option 2 to exit from the Model Query Utility.

7.3 RETRIEVE

The screen illustrated in Figure 7-14 is displayed when command 3, Retrieve, is selected from the MODEL QUERY MAIN MENU.

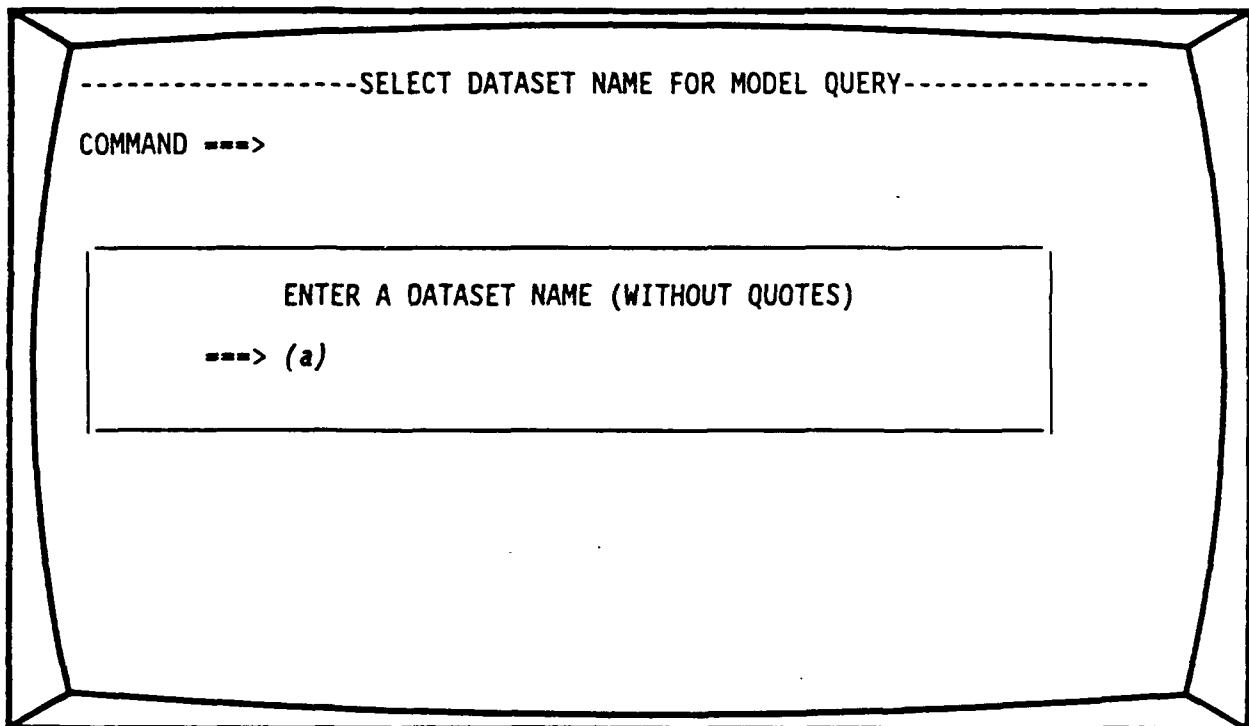


Figure 7-14 Select Dataset Name for Model Query

Menu Description:

- (a) Enter a dataset name for the model to be retrieved.
The DATA DICTIONARY DATA FILE menu will be displayed.

The **Data Dictionary Data File** screen, a subscreen of the Retrieve Function, is illustrated in Figure 7-15.

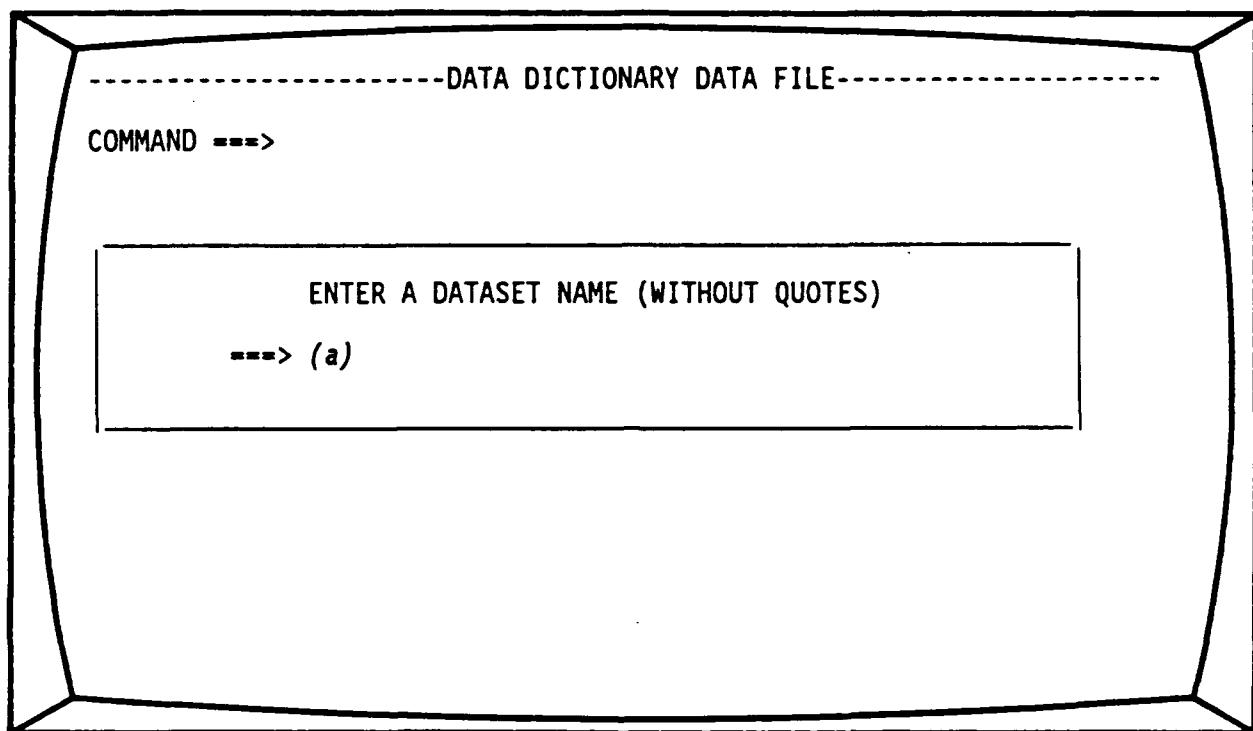


Figure 7-15 Data Dictionary Data File

Menu Description:

(a) Enter a dataset name for the data dictionary data file.
The DATA DICTIONARY INDEX FILE menu will be displayed.

UM560130002
22 December 1987

The Data Dictionary Index File screen, a subscreen of the Retrieve Function, is illustrated in Figure 7-16.

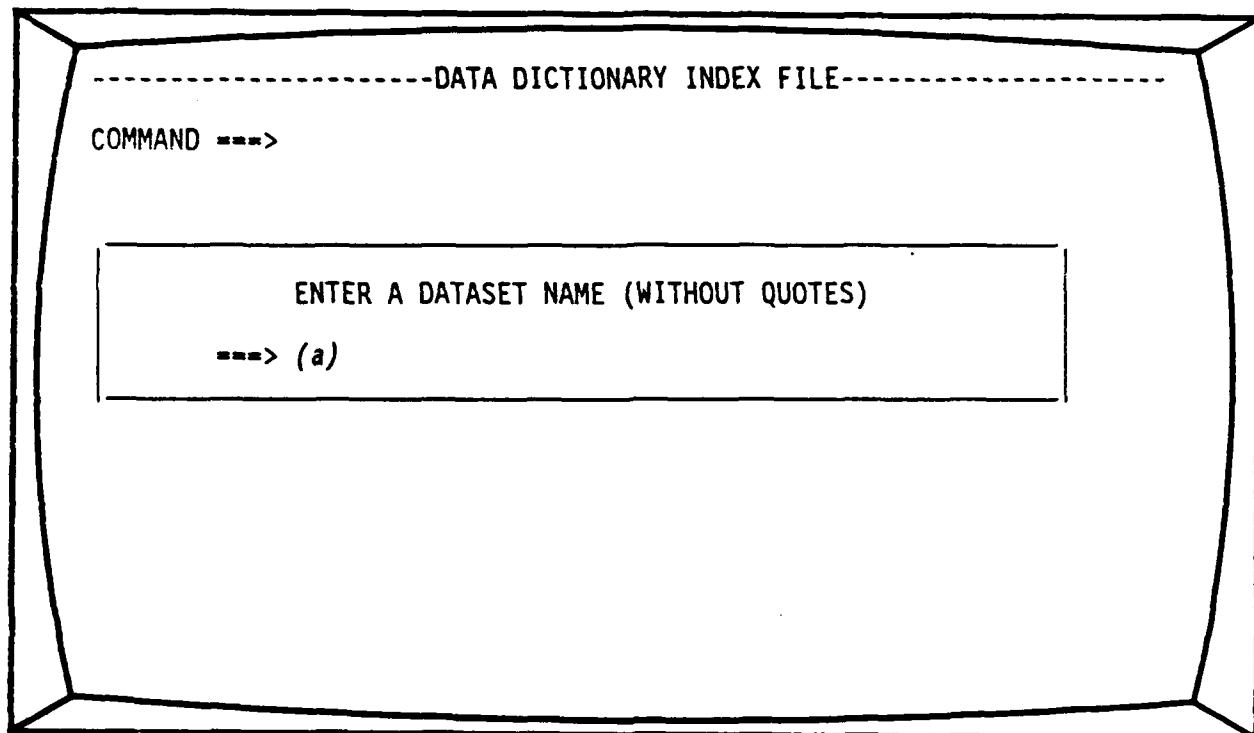


Figure 7-16 Data Dictionary Index File

Menu Description:

- (a) Enter a dataset name for the data dictionary index file.
The MODEL QUERY MAIN MENU will be displayed.

7.4 MODEL QUERY UTILITY BATCH REPORT

The Model Query Utility Batch allows the user to print entity instances of the in-core working form model.

The BATCH function enables the user to perform the following four options:

- (1) Print all entities in the model.
- (2) Print all entities of a specific kind.
- (3) Print individual instances of a specific kind.

The format of the BATCH contains the six elements listed below. These elements are represented with the appropriate reference number in Figure 7-16.

- (1) Page number, Entity Name and Total number of instances
- (2) Selected instance and Application Data Block information:
 - (a) Attribute name
 - (b) Attribute value
- (3) Constituents of this entity:
 - (c) Constituent list position and constituent reference entity kind
 - (c) Constituent reference entity kind occurrence number
- (4) Users of this entity:
 - (e) User list position and user reference entity kind
 - (f) User reference entity kind occurrence number

```
* 1 * Entity Name : ARRAY_ENTITY      (1)
Instances   : 336

* 331 * Application Data Block : (2)
  KIND          (a)      : 1100  (b)
  LENGTH        : 24
  SYSUSE        : 0
  VERSION        : 1
  SYS_IDENT      : 0
  IDENT          : 331
  CL_ENTITIES    : 1 DIMENSIONAL ARRAY OF 254 ELEMENTS

* Constituent :
  1) Name : (8004) FACE (c)           Instance No : 126 (d)

* User :
  1) Name : (1203) IMPL_T_HOLE (e)     Instance No : 44  (f)
```

Figure 7-17 Model Query Utility Batch Report